COAL AGE

Vol. 5 NEW YORK, MAY 2, 1914 No. 18

# When the Cap Burns Blue

By Berton Braley

*Written expressly for Coal Age*

I

It's waiting, waiting, waiting,
Though you don't know where,
It's lurking 'round the corner
And you must take care,
It's deadly as the lightning
When it strikes at you,
And you want to take no chances
When the cap burns blue!

II

You cannot smell or see it,
Where it lies in wait
To wrap you in the mantle
Of its deadly hate;
Perhaps you'll never meet it
All your whole life through,
But you'd better hike for safety
When the cap burns blue!

III

It steals upon you softly
It breathes upon your lamp,
Which should give an indication
Of the presence of the damp.
So if you love your children,
And your good wife, too,
You'll try to make your exit
When the cap burns blue!

IV

There's a lot of little tombstones,
Which would not be there
If the fellows lying under
Just had taken care,
But they monkeyed 'round with danger,
As some men WILL do,
And they didn't pay attention
When the cap burned blue!

V

So all you greeny miners,
You just watch your step,
There's a need of sense in mining
And I'll put you hep;
You watch the roof above you,
And the coal dust, too,
And don't you play with firedamp
When the cap burns blue!

# Ideas and Suggestions

## Educating the Public

By Mine Inspector

*SYNOPSIS—An attack on present socialistic tendencies, with arguments opposing the nationalization of mines.*

In any enterprise, whether individual or corporate, labor and capital combine through their energy, skill and financial resources to supply a product for the public in a satisfactory manner.

If labor and capital estimate correctly the public's wishes, industry flourishes, and labor and capital find the maximum of employment. If, however, in supplying that which the public wishes, labor or capital is not satisfactorily employed, they must look to the public for redress.

In the early days of feudalism, much wrong existed and no one will say that the world's democratic movement has been without a rational end, but labor has been so insatiable that today we may say new enterprise is dead, because the spirit of economic adventure has been paralyzed by the uncertain outcome of the world-wide social unrest. Great Britain has been on the verge of civil war. The Caillaux affair was only an incident in the politics of that thriftiest of all nations, France. In our own affairs, the extent to which radicalism has gone can best be illustrated by the new conception of property as expressed by Secretary of Labor Wilson or by the changes already wrought in lines of business legality.

### Dangerous Doctrines

Demagogues, parasites on the body politic, that prey upon the public, aided and abetted by their kind in our Congress and among the counselors of the nation, are to be found in every industrial community in the country, teaching the most insidious of all doctrines—that capital should not partake of the fruits of industry, for it does nothing toward the production of the nation's wealth; and that in the government ownership and operation of all industry lies the only solution of the problem. In their dangerous doctrines, they do not "appeal to reason."

Today the "Arteries of the Nation" are fighting for existence, not because of their inefficiency, as these same demagogues would have the public believe, for the railroads of this country are the grandest achievement in the science and art of transportation that the world has ever witnessed; but because the laborers of these great factors in the nation's prosperity have educated the public into believing that they are underpaid and overworked, notwithstanding that they are the highest paid railroad men in the world.

In their clamorings, these same teachers of the public do not "appeal to reason" and present for the public's consideration that the state-owned railroads of Prussia do not show a profit of six per cent., and these figures do not include a capital charge on the railway debt, or a fund for betterment, or the redemption of capital. Yet the state-owned railroads of Prussia are notorious for their inefficiency, red tape and their special tariffs.

Nor do these same counselors of the nation explain that the state-owned railroads of Austria are a constant drain on the tax payers, yielding only two to three per cent. and paying no taxes. Economists have noted that three conditions arise in the state-owned railroads: First, where they are profitable and the public treasury absorbs the profit, in which event the interests of the shippers and passengers are sacrificed to those of the government; second, where the roads are operated at a loss and the deficiency is made up by taxation, i.e., the interests of the taxpayers are sacrificed to those of the shippers and passengers; third, where all other interests are sacrificed to those of the employees, political considerations transcending those of transportation, a condition asserted to be in a varying degree an unavoidable attendant upon state ownership.

The connection between railroading and coal-mining is at once apparent when the fact is stated that sixty-five per cent. of the freight in this country is offered by the coal industry.

### Nationalization of Mines

While the problems of the railroads seriously affect the coal industry, of more genuine concern is the crisis confronting England in the proposition presented by the Mining Federation for the Nationalization of Mines, wherein it is proposed to confiscate the mineral from the present owners. The same propagandists that educate the public in the United States have as a champion of the above proposition in England Councilor Chapman of the Northumberland Miners Association who would have the public believe that in the nationalization of mines: (1) Less waste of valuable coal would occur; (2) cheaper coal for the consumers would result; (3) conditions of employees would be improved, fatalities would be less, wages would be higher; and (4) profits from the operations would be greater; but Councilor Chapman does not "appeal to 'the' reason" of the public and submit for their consideration the results of state ownership of mineral and operation of mines in France, Germany, Belgium and Australia. As a matter of fact, none of the benefits claimed for the state management of mines by Councilor Chapman have been secured by the nations which have adopted it.

A striking example of the inefficiency of state ownership of mines, mentioned by Prof. Henry Louis, in an address before the Newcastle-upon-Tyne Economic Society, is that of the Wonthaggi mine owned by the Victoria Government. Prof. Louis states that this mine is without competition, but the profits from operations were only 10c. per ton and the mines were idle during the year 1912 for six weeks while the coal diggers struck to obtain the *average* wage rate of coal diggers throughout the country.

### New Laws in Ohio

In the United States, the public is immediately concerned with the recommendations of the Ohio State Min-

ing Commission to the Governor of Ohio, dealing with the regulation of mines and the law enacted by the state legislature prescribing the basis upon which the miner shall be paid.

If the results of state ownership of mines are presented to the public in a clear and concise manner devoid of technicalities, even the most fatuous will not deny that the public would refuse to be mulcted of the heavy tax necessary to pay for the evils brought about by the state management of mines.

The problems confronting coal operators are not so much that of their relationship with labor, but rather that of their relations with the public. Today this relationship is strained and unfriendly, due to the envy and snarlings of the labor agitators who have misguided the public while the operators sit idly by. Let the publicity bureaus of the several coal operators' associations be publicity bureaus, and not bureaus of censorship from which only negative results may be expected. There is no doubt a genuine desire on the part of the public to be advised, and there is no greater work to which the operator might cheerfully contribute than that of cultivating the intellect of the public to which the rapid vaporings of the agitator do not appeal.

### The Great Issue Today

The politicians would have the public believe that the great issue of today is that of the "Workingmen's Rights," but that with which we are really concerned is the public's rights, whether the principle of private property upon which our democracy stands shall hold.

At no time in the past have the communistic theories been so strongly before the public. At no time in the past has the public been so insistent that they are paying the bills. At no time in the past has the public so strongly appealed for relief from the political octopus whose tentacles are sucking its life blood at every pore. The common sense, fairness and self interest of the public have never been greater, for it has become apparent that the high cost of living is the price paid for following the teachings of the socialistic demagogues and political campaigners.

That the lesson to the public, as exemplified in the present hard times, should be allowed by the mine operators to pass unnoticed, is almost unbelievable.

## An Ounce of Prevention versus a Pound of Cure

By Anthracite Engineer

Some time ago, I had occasion to go into one of Pennsylvania's largest coal mines, and while climbing a breast with the fireboss, we noticed two miners tamping their holes with a piece of steel. I remarked to the fireboss how dangerous and unlawful this practice was, and my suggestion brought forth the reply, "They've probably left their tamping stick in the gangway, and there is no use to say anything, for they'll use their steel again as soon as my back is turned."

In how many mines of the country is this same thing being duplicated day after day. In every catalog of high explosives, in the rules of practically every mining company, and in the state laws, it expressly implies that none but a wooden or soft-metal tamping stick should be used. Is this rule inserted merely to fill space? No! "There's a reason," as every mining man with any common sense knows. The number of deaths caused by the wilful violation of this simple rule will never be known, as there are rarely any witnesses left.

### The Company Officials Are Responsible

Now, Mr. Foreman and Mr. Fireboss, it's up to you. You know that a steel tamping bar is used in violation of all rules and good practice; therefore, why do you allow it? Because the miner won't pay attention to you if you do tell him? That's not sufficient. A nurse girl leaves her charge, thinking he will not burn himself with the safety matches with which he is playing. He does burn himself, however, and morally, if not legally, the careless nurse is responsible. Now are you not in the same position as the nurse girl. "No," you say, "the men know better, and if they take a fool chance I'm not to blame." But you are. The men in your mine are employed by your company, and that company is to a greater or less extent responsible for anything that happens to those men.

Now whose business is it to see that those men do a good day's work? Your business. Then, is it not also your business to protect your company by not allowing the men to do anything which will be of danger to themselves or to the mine?

### Fire the First Man Who Disobeys

What can be done if a man persists in using steel for a tamping bar? Why, fire him on the spot. You say, "Good miners are scarce." We believe you, but fire one or two and see if the others don't get in line. Oh, yes! —the Union. Well do you think any sane body of men could say much against your protecting the miners under you from their own carelessness?

But wait. Some weeks ago a man demonstrating dynamite, informed me that in the mines of one fairly large company he loaded over 800 holes and could not find a tamping stick more than half a dozen times. The foreman had ordered tamping bars, but someone with an eye toward making a hit with the "big boss" decided that this was a place to economize. Economy is a great thing, we all admit, but when carried to the extent of being "pound foolish and penny wise," it sometimes borders on being criminal.

There is an old adage, which says, "an ounce of prevention is worth a pound of cure." Now, we've spent thousands in hospitals and first-aid, and have our pound of cure; but why not apply the ounce of prevention first, as the cure can never bring back a life.

It is the conviction of James Lomax that a systematic microscopical survey of the various coals will lead to results of the utmost value in (1) determining the geological age; (2) the identification and correlation of seams, and (3) the various constituents therein and their effect on the causes of spontaneous combustion and inflammable dust.

When testing for gas with a lamp, the length of the "cap" with a given percentage of gas is not necessarily unalterable. As lately pointed out, with the very best intentions in the world and with the best management, the oil employed in the lamps at the colliery may vary; the wicks may vary; the method of trimming the lamp, both in the lamp room and when making the test underground, may vary; there may be more dust about the lamp at one time than another. These and other causes may easily affect the "cap."

# The Amherst Company's Plant in West Virginia

By W. M. Judd*

*SYNOPSIS—Description of a plant equipped with some elaborate retarding conveyors and also an effective screening arrangement. Two seams are mined about 200 ft. vertically apart.*

During the past year the Amherst Coal Co. has completed and put in operation a new plant at Amherst, Logan County, W. Va. The lease upon which the company is operating is situated about five miles from the Guyandotte River on Buffalo Creek and is reached by the Buffalo Creek branch of the Chesapeake & Ohio R.R. Its lease comprises about 1300 acres and is underlaid by at least three merchantable seams, as follows:

1. The "Eagle," which does not outcrop within the limits of the lease and is not being developed at the present, although the company has recently acquired the adjoining lease upon which the "Eagle" seam is being worked. The tipple on this latter lease is about half a mile downstream from the Amherst Coal Co. tipple. The elevation of the bottom of coal at the pit mouth is 880 and the coal is 6 to 7 ft. thick at the faces of headings. Eventually all three seams will be operated from drift mines under the Amherst lease.

2. The "Island Creek," outcrops almost 200 ft. above the railroad at an elevation of 1092 ft. above sea level. There are about 1000 acres of this seam upon the lease, averaging approximately 5 ft. in thickness. This is the seam in which the pioneer developments of the United States Coal & Oil Co., at Holden, W. Va., were made in 1903, and which has established the trade name of "Island Creek Coal," on account of its fine quality for steam and domestic service.

3. The "Winifrede" outcropping at an elevation 1355 ft., underlays about 700 acres and averages about 9 ft. thick.

Amherst is typical in many ways of the small mining settlements that are being developed in Logan County as rapidly as the railroads can provide transportation for the output of the mines. A slight widening of the narrow valley is occupied by the tipple, railroad tracks and a portion of the town, while perforce many of the miners' houses must be placed on the side of the steep foot hills.

## The Tipple and Retarding Conveyor

As has been previously stated, the Island Creek seam outcrops about 200 ft. above the railroad. The run-of-mine coal is brought to the tipple by a retarding conveyor 420 ft. long, having a maximum slope of 30 deg. from the horizontal.

View of Power Plant, Tipple and Part of Town

The headhouse, located directly in front of the pit mouth of the loaded-car haulage heading, contains the hopper bin into which the mine cars are emptied by a kick-back dump. The coal is delivered from the hopper bin to the retarding conveyor by an apron-type feeder, driven by the same motor that operates the retarding conveyor. Between the feeder and conveyor the coal passes over a short section of bar screen. The fine coal is thus deposited on the conveyor in advance of the lump. The section of the conveyor directly under the screen is horizontal, passing thence over a vertical curve to the 30-deg. slope section. The lump coal coming to rest on the bed of fine coal never shows any tendency to roll when it reaches the steep section.

The retarding conveyor, of the double-beaded pan type, is driven by a motor located in the headhouse. Maxi-

*Engineer, the W. G. Wilkins Co., Westinghouse Bldg., Pittsburgh, Penn.

mum power is required when the conveyor is running empty, and when it is running full, the motor becomes a generator and throws power back into the line. The conveyor traveling 60 ft. per min., has a capacity of 200 tons of run-of-mine coal per hour.

### Screens and Gravity Plane

The conveyor delivers the coal over a chute to the shaking screens. The screens are in two sections, driven by eccentrics placed 90 in. apart on the same shaft, which latter is driven by a belt from a motor. The upper screen is 4 ft. long and has bars spaced ¾ in. The fine coal passing through this bar screen is received by a small drop-bottom car for delivery to the boiler house. The remaining portion of the upper screen is a perforated steel plate, taking out all coal 1¼ in. in size and under. A hopper bin receives the combined nut and slack coal for loading on the first railroad track.

The screening surface of the lower screen is a stepped-steel plate with perforations 3x10 in. The egg coal passing through the perforations is received by a hopper bin over the second railroad track. The lump coal passing over the screens is carried by a radial chute with adjustable apron for loading cars endwise on the third railroad track. A retarding gate in the radial chute enables the car loader to control the flow of coal, so that there is a minimum breakage of lumps in the car. The resultant egg and lump coal produced by this screening equipment has proved highly satisfactory to the trade. The retarding conveyor and tipple equipment was furnished and installed by the Pittsburgh Coal Washer Co.

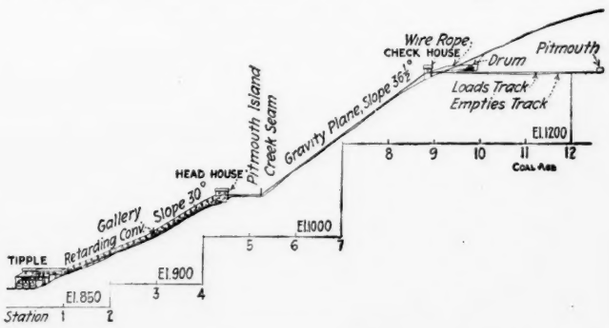



Diagram Showing Method of Handling Coal from Pit Mouth to Tipple

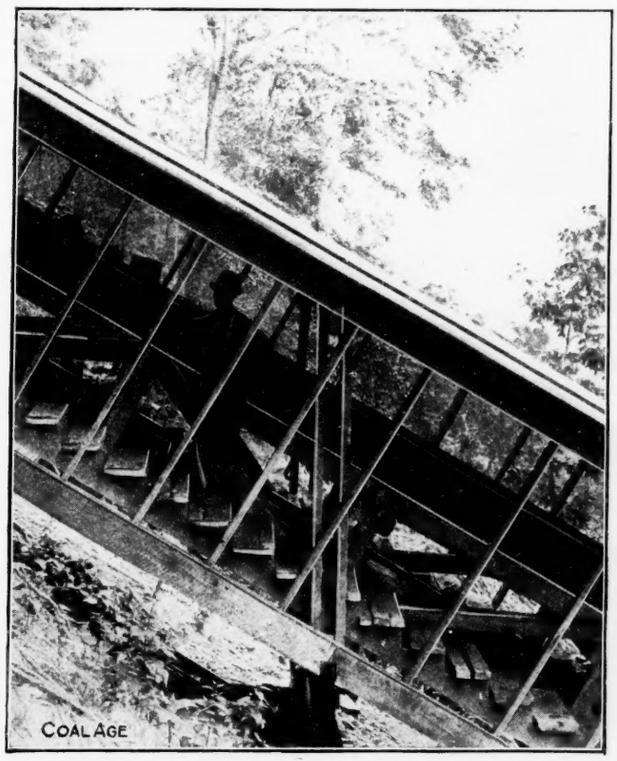
The analysis and physical characteristics of the Winifrede and Island Creek seams are remarkably similar at this point, so that there is no necessity for the separation of the two coals in loading. The mine cars from the upper seam are lowered over a gravity plane and the coal dumped into the same hopper with that from the Island Creek seam. The plane is 450 ft. long between knuckles and has an average slope of 37 deg. from the horizontal. The plane is operated by a drum 8 ft. in diameter, supported by a heavy timber framework anchored into the rock about 90 ft. back of the knuckle. There is an outside tramroad about 375 ft. between the head of the incline and the pit mouth.

### Methods of Mining and Power Plant

In both seams the headings and rooms are driven practically on, or at right angles to the cleavage of the coal and the main headings in the upper seam are located vertically over the main headings of the lower seam. The development of the upper seam will be kept well in advance of the lower, so that the mining of the upper seam will not be affected by rib-drawing in the lower.

The power house is a stone building, containing one battery of boilers, one direct-connected, engine-driven, 250-volt, direct-current generating unit, water-supply and boiler-feed pumps and feed-water heater. Sufficient space for the duplication of the power plant has also been provided.

Views of the power plant, retarding conveyor, a portion of the town and the gravity plane from the upper seam, are shown in the accompanying halftones. The W. G. Wilkins Co., of Pittsburgh, were the engineers for the Amherst Coal Co., and all construction work was under the direct charge of their resident engineer at Logan. All the work was personally supervised by J. E. Schweitzer, general manager of the Amherst Coal Co., to whose efficient management is due the early date at which the entire plant was put upon a successful operating basis.




Side View of Retarding Conveyor

## BY THE WAY

Precaution is better than repentance.

Do not wade where you see no bottom.

Some men change their principles oftener than their shirt.

Modesty, like a diver, gathers pearls by keeping his head low.

Promises may make friends, but 'tis performance keeps them.

# Overcasts and Stoppings in Mines

By A. W. Hesse*

*SYNOPSIS—Terra-cotta building blocks are now in satisfactory use for the construction of stoppings and for overcast walls. They are 40 to 50 per cent. cheaper than concrete walls and stoppings, though about equally more expensive than wood. The roofs of overcasts have been made successfully of plastered expanded-metal lath and it is probable that stoppings of similar material would give equal satisfaction.*

In an article published in Coal Age (Vol. II, No. 6, Aug. 10, 1912), the use of terra-cotta building blocks was advocated for stoppings and overcasts. It was also suggested that expanded metal or wire mesh be used in place of scrap-iron pipe and steel mine rails when using concrete for such work, especially for the tops of overcasts.

Since that time the terra-cotta blocks have proven beyond a doubt their usefulness in a mine, as well as for the purposes to which they are put outside. Not only have they been used economically for stoppings along the main air courses, but they are now being adopted successfully for the walls of overcasts. It appears also that scrap iron is to be displaced by a reinforcement which gives a concrete structure not only more artistic but more economical and more quickly erected.

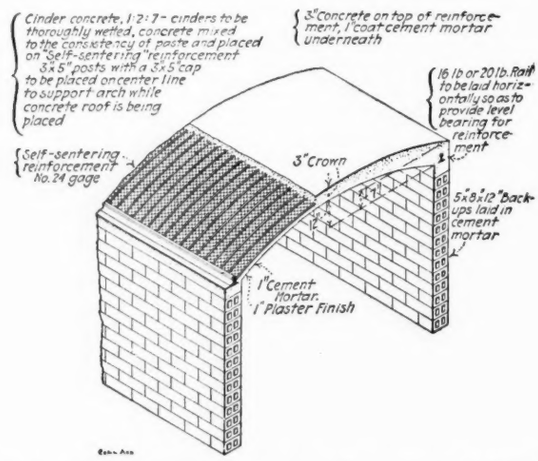

Cinder concrete, 1:2:7 - cinders to be thoroughly wetted, concrete mixed to the consistency of paste and placed on "Self-sentering" reinforcement
5x5" posts with a 5x5 cap to be placed on center line to support arch while concrete roof is being placed
3" Concrete on top of reinforcement, 1" coat cement mortar underneath
16 lb or 20 lb. Rail to be laid horizontally so as to provide level bearing for reinforcement
Self-sentering reinforcement No. 24 gage
3" Crown
5x8x12" Backups laid in cement mortar
1" Cement Mortar. 1" Plaster Finish

Fig. 1. A Standard Fireproof Overcast of Cheap and Permanent Design

## Terra-Cotta Stoppings 40 Per Cent. Cheaper Than Concrete

The Consolidation Coal Co., as a preventative of fire at the same time as a safety-first measure, decided to eliminate wood stoppings and wood overcasts where practicable and to allow no more new overcasts anywhere to be constructed of combustible material, the same to apply to permanent stoppings along main entries.

The most natural step was to use the cinders from the boiler house at the mine and to build these structures of concrete. However, investigation proved that too much money was being spent for these improvements. The stoppings were reduced to a thickness of 4 in., but the cost still appeared too large.

The terra-cotta blocks were first used for stoppings and their success was readily apparent. As the 4-in. cinder-concrete stopping had proven stable, a hollow block of 4-in. width was at first advocated; but the 5x8x12-in. block was finally adopted and has been used as a standard ever since.

On main entries where the stoppings are intended to remain for a considerable length of time they are bonded with a mortar composed of one part cement to two parts sand. On room headings where these stoppings have been built, lime was used in place of the cement, this making it possible to tear down the stopping when desired, without destroying the tile.

Sufficient cost data have been obtained on the construction of this type of stopping at the mines using this material to show a saving of from 40 to 50 per cent. in every instance as against the use of concrete. The cost compared to wood stoppings for room headings shows about the same difference in favor of the wood. It was thought that by the recovery of the blocks and their reuse this difference could be more than offset; but accurate costs kept on this work shows that it would be necessary to recover these blocks several times over to do this. Therefore, it is not advisable to use the blocks for temporary structures unless for other reasons than economy.

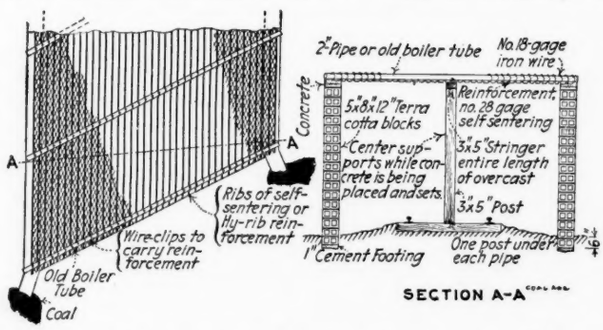



Fig. 2. Plan and Elevation of an Overcast Built of Reinforced Concrete and Hollow Block

The crosscuts in the mines of the Fairmont Region run about 10 to 12 ft. wide and 7 to 8 ft. high, and average about 80 sq.ft. in area. It has been found that two men will construct three or four stoppings per day, providing the material is placed ready for their use.

## Brattices Made as Screens of Lath Coated with Cement or Lime Mortar

We might be able to reduce the cost of stoppings further by the use of "Self-sentering," "Hy-Rib," or "Rib-Lath," plastering these with a cement mortar an inch or two thick. A stopping made with any of these materials properly placed, should carry as much as, or more pressure than, the ordinary wood stopping. The plan of erection would be simple, consisting of trenching the ribs, roof and bottom an inch or two, slipping the adopted metal in place and plastering with cement or lime mortar, the material depending upon the desired life of the stopping. Price and the strength which could be secured should govern the selection of the reinforcement. A heaving of the bottom would in all probability be cut by

*Assistant chief engineer, The Consolidation Coal Co., Fairmont, W. Va.

the stopping, since heaving is caused by the swelling of the fireclay, this material at the same time softening markedly. If the pressure comes from the top or roof there might be much deflection in the stopping without doing it any material injury, besides it could be as easily repaired as the wood stopping in case of sufficient pressure to cause cracks in the plaster.

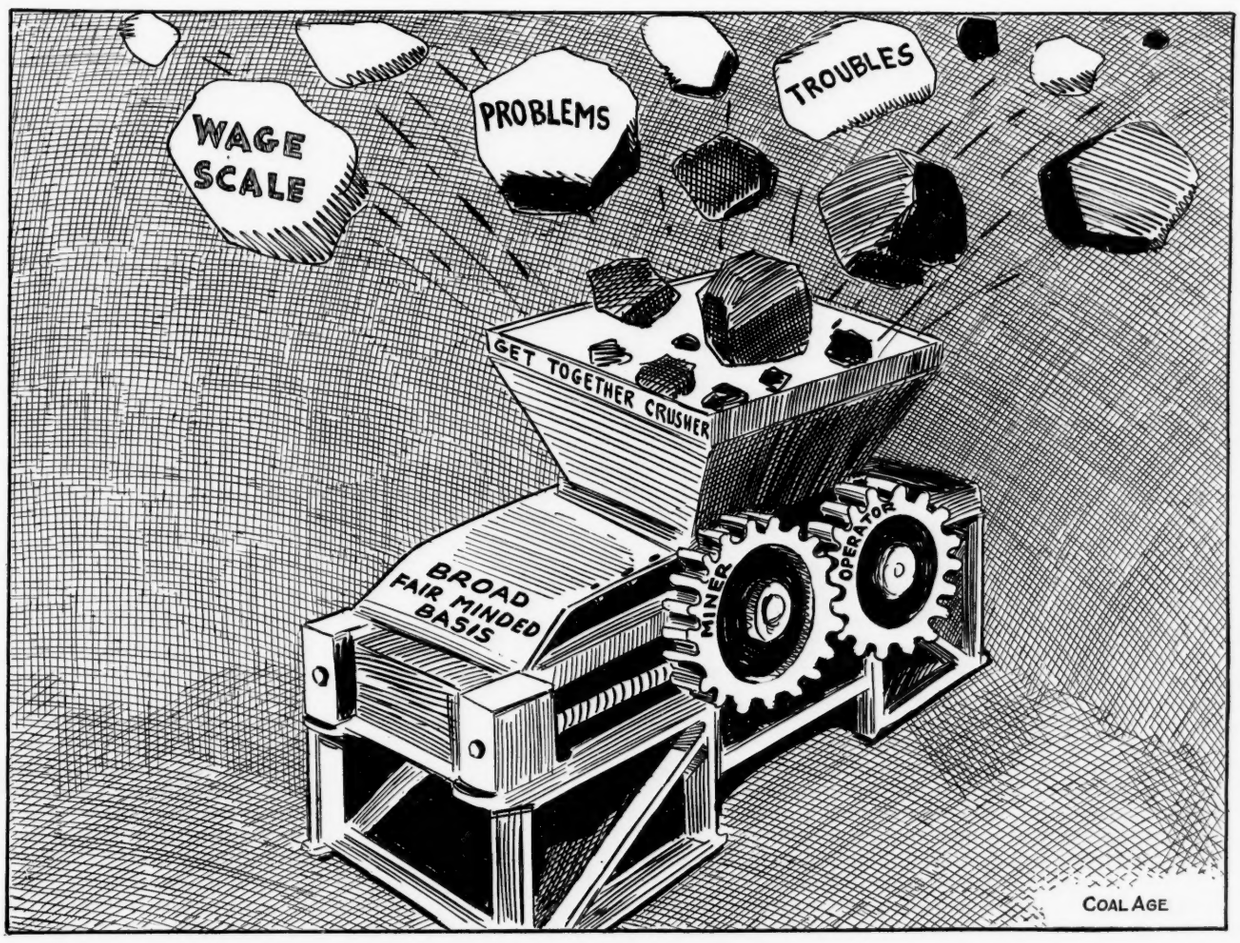
### Overcasts with Air Crossing of Expanded-Metal Lath Plastered with Cement Mortar

All well ventilated mines must contain overcasts, and the costs of these structures soon run into considerable amounts, if they are not carefully planned and constructed. There are few mine foremen or even superintendents who take the trouble to ascertain accurately just what it costs to erect an overcast so that he can tell you how much was spent per cubic yard for concrete or what the walls and roof cost separately.

Fig. 1 shows the type of overcast now being constructed in the mines of The Consolidation Coal Co. in the Fairmont Region. Blank spaces are left in the blueprints, and dimensions to suit the location are supplied. Since the sheets of "Self-sentering" are sold in even foot lengths, the distances between walls are made to correspond. Thus for an 11-ft. sheet 2 in. are deducted for the 12-in. rise and two or more inches on each side for bearing spaces, leaving the distance between walls 10 ft. 6 in.

This style of overcast makes use of the terra-cotta blocks, the 5x8x12-in. block being laid to give 8-in. walls. On top of each wall is placed a layer of concrete on which is set a small steel rail 2 in. from the edge of the wall. Then the reinforcing sheets of "Self-sentering," which come already shaped, are placed abutting on the flanges of the rails and the center line or middle of the reinforcement supported by a 3x5-in. wood stringer; then the concrete is spread on the top as required on the plan. After the concrete sets, the wood stringer is knocked down and a coat of cement mortar plastered underneath. Not a single wood form is required on the whole structure, except around the iron rails on top of the walls, and even this can be eliminated by standing a row of the terra-cotta blocks on the 5-in. side just outside of the rails, thus making them serve as forms.

There are times when it is necessary to deviate from the arched-roof type on account of the skew of the air bridge, in which case it is more economical to use the flat roof. Fig. 2 presents a design of this kind where the roof is supported by three or four old boiler tubes, the reinforcement being suspended from these tubes or pipes by means of wire of sufficient strength to carry the weight. This type of overcast also needs only temporary supports along the middle while the concrete is being placed, thus saving considerable labor and material in the construction and emplacement of forms.




The New Coal Crusher That Must Soon Be Installed over the Land

# A German Coal-Screening Plant

Special Corespondence

*SYNOPSIS—A typical German installation, preparing many different sizes of coal for market and for coking.*

The universal attention which is being given to the development of up-to-date coal-handling equipment and practice is as pronounced in Germany as elsewhere. The accompanying illustration shows a coal screening and washing plant installed at Shaft No. V, of the Rheinpreussen coal mine.

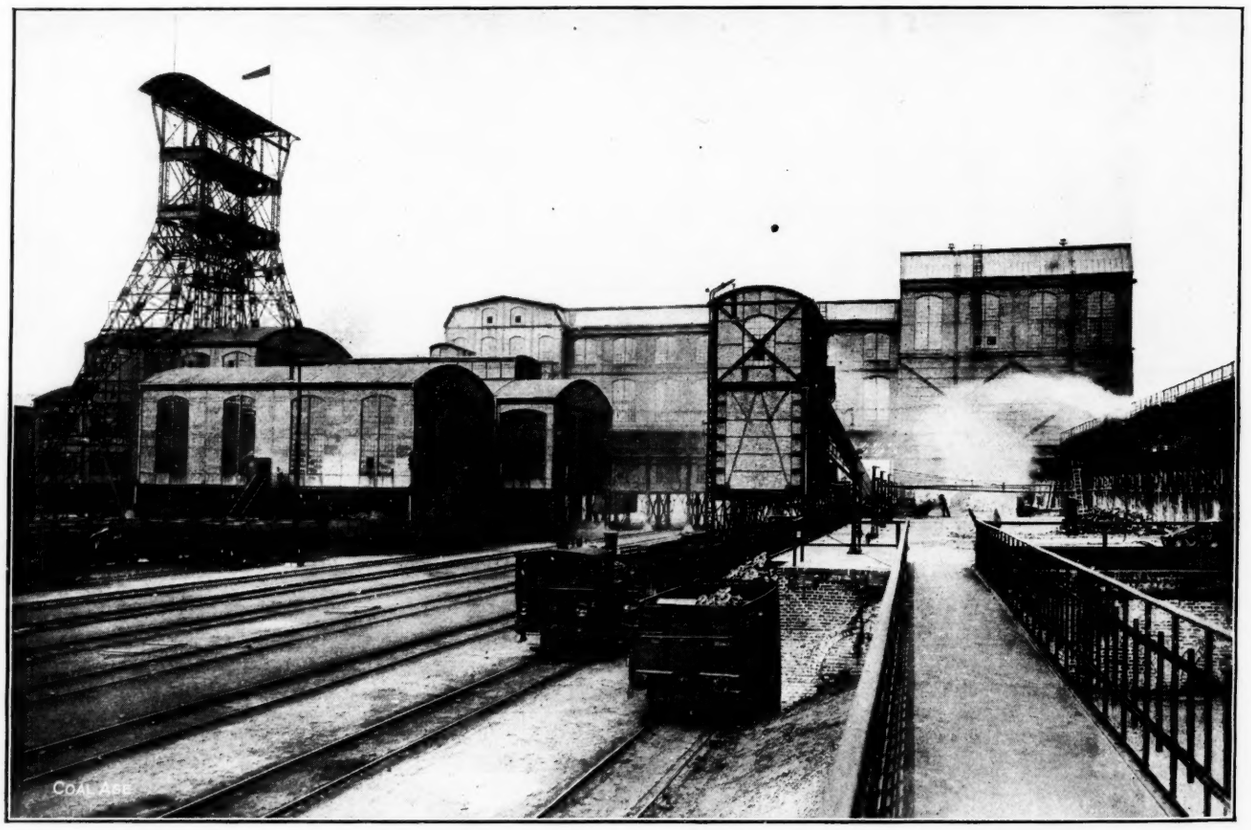
At this plant, the loaded pit cars arriving at the height of 9 m. (approximately 10 ft.) above the first pit-bank level, are sent direct to the screening plant. Brakes on cars taken from the second and third pit-bank levels, permit of their being lowered to the first level. The track from this point has a gradient of 2 per cent., allowing the cars to run by gravity to the dumps, which are mechanically operated and which discharge the coal onto the shaking screens.

The screens are double decked, the upper openings being 85 mm. (approximately 3¼ in.), while the lower deck has small perforations. The screens are provided with veil plates. By this arrangement the coal below 3¼ in. is discharged into a storage hopper, while the larger coal goes onto picking tables and loading booms. If the veil plates are closed no separation is made, and the entire run of mine is loaded directly into railway cars.

Two additional shaking screens are provided, being furnished with rectangular holes of adjustable size, varying from 40 mm. to 80 mm. (from approximately 1½ in. to 3 in.). These produce what is called best mixed coal, which is loaded into railway cars by means of loading booms, which are raised and lowered by power.

In order to be able to weigh the loaded railway cars immediately, scales are built into the tracks and are operated from the picking-table platform. The refuse which is removed from the coal on the picking belt is thrown into trucks, which are hoisted to the pit-bank level, from whence they are run to a dump or otherwise disposed of in stowing processes.

Each screening system is driven by a shaft and belts from an electric motor, which is installed in an inclosure. The empty cars after dumping return to the shaft by gravity, and are there lifted to the pit-bank level by means of creepers or car hauls.




General View of Tipple, Washery and Coke Ovens

A coal-washing plant of two units is directly attached to the screening plant, and has a capacity of approximately 200 tons per hour. The dust coal, or that under 5 mm. ($\frac{3}{16}$ in.) is screened dry and mixed with the washed fines. Four varieties of nut and coke coal are produced, the shale being rewashed. The nut coal stored in bunkers under the pit-bank floor is delivered to the dust screens in the washery by two bucket elevators, the feed for which is mechanically controlled. After the removal of particles under 5 mm. in diameter, which is stored

in a steel tank underneath the screen, the coarser material flows in a launder to a main washery, where it is cleaned.

Provision is made by reversing shutters in the nut launder to flush the washed nuts to the bell mills, above the dredger sump, into which they fall after reduction, and are treated like fines.

In order to be able to mix foreign fines with those here produced, a bucket elevator is installed, which conveys this material arriving in railway cars, which are dumped into a storage pit, onto the distributing tray above the tower.

Above the coking-coal storage tower, which has a capacity of about 4000 tons, four distributing trays are installed, with four scrapers each. The fines arriving here on the draining belt are discharged onto these trays by two parallel screw conveyors, one for each system. By reversing the direction of rotation of these conveyors, provision is made to fill the whole tower from the belt conveyors of one system if the other is not in operation. In the bottom of the storage tower 96 discharge gates are fitted. These deliver the drained fines into larries, which carry them direct to the coke ovens.

The shale from the washers is discharged into conveyors, from whence it is delivered into bucket elevators. These discharge onto belt conveyors, where draining is accomplished. The refuse material is then delivered to shale crushers. Provision is also made for washing this material over again after being crushed.

The coal separated from the shale in the washing process flows to the dredger sump, while the shale is delivered to a tower by a bucket elevator. From this tower it is discharged into trucks, by which it is conveyed to the dump, or transported elsewhere for stowing purposes.

Shale, rock, etc., arriving on pit-bank level are dumped and uniformly fed to jaw crushers erected on the level of the picking belts. These crushers reduce it to the desired size, and discharge into a steel storage box underneath. From here the crushed material can be delivered into railway cars or into the shaft for stowing purposes. The former arrangement is at present in use; the latter may be supplied later on.

The water from the preliminary draining screens and belts flows into clarifying spitzkasten, where the sludge gradually settles. This is discharged from time to time through launders into the sludge sump, from whence it is delivered onto the preliminary draining screen by a centrifugal pump.

The washed nut coal is conveyed by water to the nut screen where it is classified into five sizes—four nut sizes and one fines. The four nut sizes are carefully transported by spiral conveyors into their corresponding storage bunkers, from whence they are delivered to a fixed spraying screen, and after being rinsed with fresh water are directed onto the nut-loading belt, thence by adjustable loading booms into the railway trucks. The raising and lowering of these booms is effected by power, the dead weight being counterbalanced.

If the washer is not in operation, the nut coal is delivered directly into the nut bunker by reversing the shutters of the feeding bucket elevators. It is then loaded into railway cars by adjustable chutes. The fines are carried by the wash-water from the nut-classifying screens into dredger sumps, from whence they are delivered into the two fines washers by two bucket elevators. After being rewashed they are conveyed by launders into preliminary draining screens above the draining belts, and thereafter onto the draining-belt conveyors, which move slowly, thus giving ample time for the water to be removed.

## The Passing of the Mine Mule

Quite some time after the close of the Civil War and old negress, seeing for the first time a motor-driven street car, exclaimed: "Fore Gawd, dem Yankees ain't satisfied wid 'mancipating de niggers, dey dun freed de mules."

Yankee ingenuity today is taking another great stride in the emancipation of these humble but faithful servitors. The mine mule is giving place before the encroachments of mechanical equipment, and the prediction is made that a few years will suffice to complete its displacement in all of the larger workings.

The mule-drawn car is a relic of the past that has come down to the present. A time-honored institution, but a detriment to efficiency in modern coal-mining methods. The mule, also, has been one factor in the haulage problem constituting a considerable item of expense. Its elimination was foreordained.

Recently, the Long Branch Coal Co., of Long Branch, W. Va., made public certain comparative data regarding the relative costs per month of mule haulage and gasoline haulage, which may be summarized as follows:

Total cost mule haulage, $810 per month.
Total cost gasoline haulage, $529.63 per month.
Decrease in haulage cost, $280.37 per month.
Total coal tonnage by gasoline locomotive, 11,601 tons.
Total coal tonnage by mules, 7848 tons.
Increase in coal tonnage output, 3753 tons.
Operating cost per day, gasoline haulage, $21.19.
Operating cost per ton gasoline haulage, $0.046.
Operating cost per ton-mile gasoline haulage, $0.0304.
Reduction in haulage cost per ton, $0.058.
Reduction in haulage cost per ton-mile, $0.0696.

In short, the comparison shows an increase in mine tonnage, and a decrease in haulage cost.

The gasoline locomotive used in the preceding test was manufactured by the Milwaukee Locomotive Mfg. Co. It is an effective combination of automobile propulsion and locomotive construction. It is a vertical-type engine with vertical cylinders. The important parts are six or eight times as large as those used on the ordinary automobile. The bearings are larger and the whole idea of construction is that the machine shall be fit for heavy work. There is a three-dog arrangement on the flywheel, which prevents the chance of back-firing when the engine starts. The governor is worked with a worm gearing which prevents the locomotive from racing and also cuts down the consumption of gasoline. It has lever control throughout and dry-plate transmission.

The Long Branch Co. found their locomotives capable of hauling eight loaded mine cars at a trip, over a 3000-ft. haul, with an average grade against the load of 3 per cent.

Assuredly, the course of the mine mule is almost run.

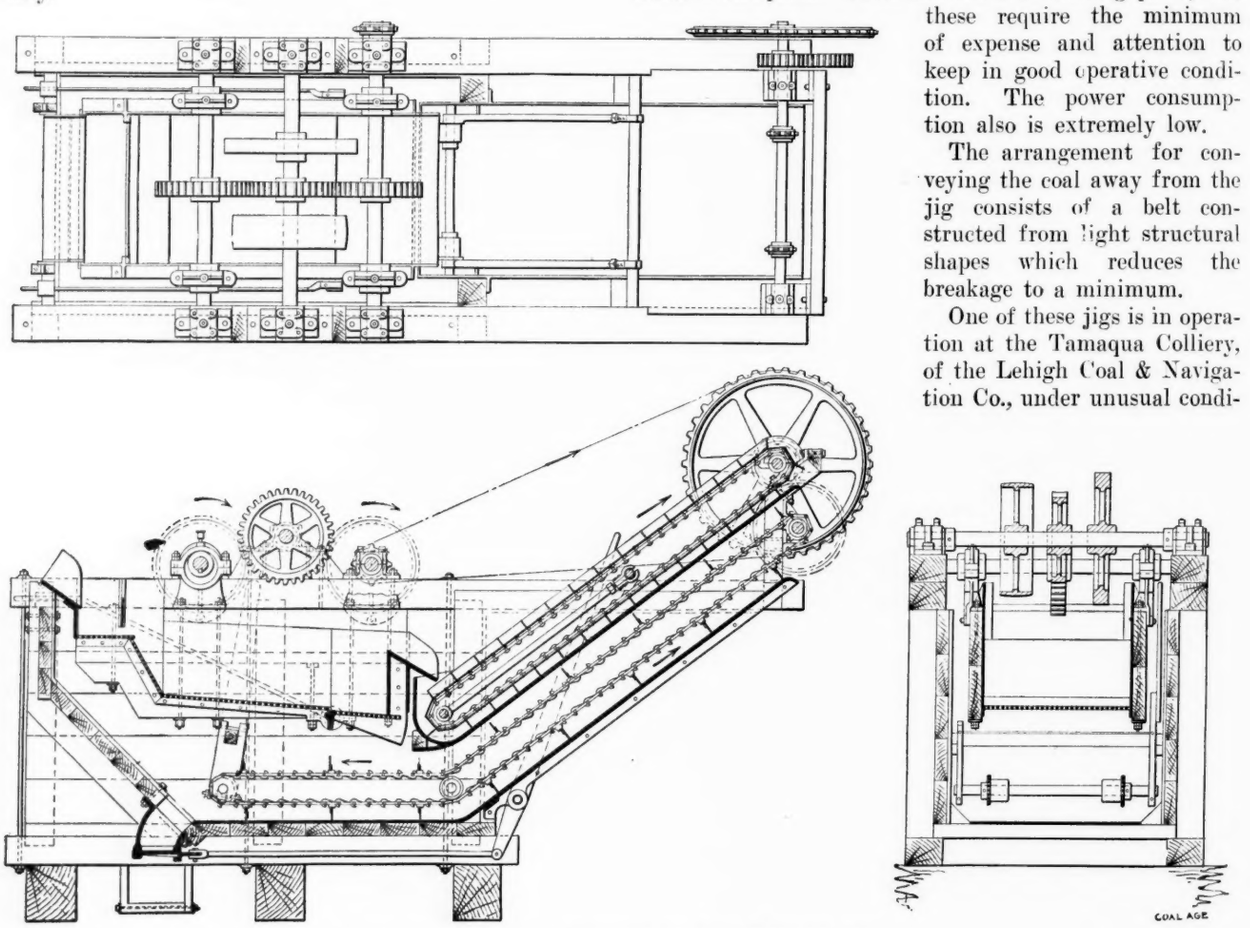
Some authorities doubt the efficiency of stone dust to prevent explosions, especially if firedamp is present in greater or less quantities. The Altofts collieries of England have abandoned the stone dust zones and substituted a general scattering of the stone dust wherever coal dust is found. Experiments made at Liévin, France, have shown that this method is useless as far as stopping a powerful explosive wave that has gotten a good start.

# A New Rotary Coal-Washing Jig

By E. A. James*

A new departure in coal- and ore-jig design is shown in the accompanying drawing of the "Rotary Jig," manufactured by the Mauch Chunk Iron Works, Mauch Chunk, Penn., under the Rotary Separator & Engineering Co. patents.

Since the water tank of this machine is suspended from eccentrics, this jig gives a rotary impetus to the material to be separated, thus overcoming the sluggish travel produced by the jigs having only straight vertical acceleration, thereby, approximately doubling the capacity.




Two Views and a Section of the Rotary Jig

Anyone familiar with jigs and jigging realizes that the capacity of a machine of this kind is not governed by the time taken to make the separation, but rather by that consumed in freeing the apparatus of both the coal and slate after the separation has been accomplished, preventing meanwhile the remixing of the coal with the impurities.

The rotary motion gives a forward and upward acceleration to the material and during the recovery, when the laws of freely falling bodies in a liquid medium have full controll, the coal and impurities settle to their distinct and separate positions. Thus, the rate of travel and efficiency of separation are greatly increased. By means of the variable directions of the lines of force, pieces of flat material cannot keep their greatest resistance area opposed to the action of the jig; consequently their separation is accomplished as readily as cubical or fractured material.

This machine is equipped with an automatic slate discharge, which works with the highest efficiency due to the rotary motion. Another advantageous feature is the self-flushing design, in as much as the tank requires no flushing, whatever, as all waste material no matter how small, is removed with the slate and other impurities. It is claimed that this feature gives the "Rotary" the distinction of consuming less water than any other type of jig.

The general design is compact and simple, occupying little floor space. There are but few wearing parts, and these require the minimum of expense and attention to keep in good operative condition. The power consumption also is extremely low.

The arrangement for conveying the coal away from the jig consists of a belt constructed from light structural shapes which reduces the breakage to a minimum.

One of these jigs is in operation at the Tamaqua Colliery, of the Lehigh Coal & Navigation Co., under unusual conditions. It is taking all material that passes through a 2⅝-in. mesh and over a ½-in. mesh from the slate ends of 17 Lehigh Valley jigs and washing all sizes simultaneously.

The material fed to this jig contains from 90 to 95 per cent. of rock and slate, which taken in connection with the wide range of sizes makes the test a severe one. The percentage of coal in the slate discharge from the "Rotary" jig, based on the average obtained from daily tests, is about one-half of one per cent. The coal from this machine is conveyed back to the breaker and rejigged.

While the above instance is cited to show the efficiency of this machine, its use is not limited to separating the slate tailings from other jigs as it is designed for general work.

*Mauch Chunk, Penn.

# Coal-Washing Efficiency Calculations

By G. R. Delamater

*SYNOPSIS—There are several kinds of jig efficiency. One depends on the ash removed, another on the coal saved and a third on the power used or wasted in washing. The last efficiency is relatively unimportant. The washery expert should endeavor to obtain not pure coal but a fuel of such purity as will secure the most profit on the market: Learning how much of such fuel there is in the coal as he receives it, it is his duty to obtain as much of it as possible, eliminating as far as he can all parts of the coal which would give an inferior ash analysis.*

In the issue of *Mines and Minerals*, of March, 1912, I presented a paper under the title of "Standardization in Coal Washing." Little discussion followed, as a result, in the columns of the engineering journals, but the subject has been taken up with me in a personal way many times, some approving of my method of calculating coal-washing efficiencies and others pointing out possible faults but none offering a solution of the problem.

I have applied that method of calculating the efficiency of washing to a great many tests which I have made in different parts of the country and have found it impossible to apply it in some washeries and in many others I have found that the resulting figures were not all that could be desired, though they were helpful to a certain extent.

From the objections given by those who have investigated the subject with me, together with a careful study of the various conditions I have found existing in different washeries, I have compiled a new set of formulas, which I have applied to many washing plants and found satisfactory.

In presenting these new formulas, it is my hope that those interested in the subject will, through the columns of Coal Age and other engineering papers, point out any features which appear to them to be objectionable or in error, and if possible, offer suggestions which will assist in devising a satisfactory method of calculating coal-washing efficiencies.

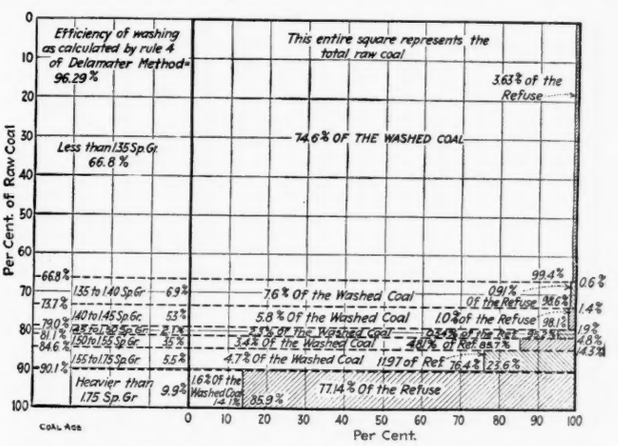
## Hancock's Table

One of the replies to my previous paper was received from Arthur Langerfeld, in which he speaks of the necessity of making float-and-sink tests with baths of different densities, in order that the amounts of the materials of various specific gravities may be determined, thus, for instance, showing the amount of "bone coal" present. The reader will, no doubt, be interested in a chart compiled by David Hancock, consulting engineer and chemist, of Birmingham, Ala. A specimen of this chart was included in a paper written by Mr. Hancock, under the title of "Coal Washing in Alabama," published by the Alabama Geological Survey.

As I wish to use this chart in presenting my formulas, I reproduce it here with some slight alterations in the figures shown on the original chart in order that an exact check may result throughout all the calculations, though the figures given by Mr. Hancock check remarkably with the theoretically correct figures resulting from actual float-and-sink tests and analyses made, and show that these were conducted with care and accuracy. The results also indicate careful and accurate sampling.

In his explanation, Mr. Hancock says:

"I have devised a chart upon which can be shown, graphically, the composition of the run-of-mine coal,




Hancock Chart of Washery Performance

washed coal and refuse." The chart here presented is a specimen representing the work done by Stewart jigs cleaning a coal of which separations by the float-and-sink tests, gave the results shown in Table I.

TABLE I. TESTS AND ANALYSES OF RAW COAL

| A | B | C | | D | | E | F | G | H |
|---|---|---|---|---|---|---|---|---|---|
| | Specific Gravity of Materials | Percentage Relation of Each Material to Coal | | Percentage of Ash in Each Material | | Percentage of Ash in Terms of Raw Coal | Combining, Materials of Different Specific Gravities | Percentage Resulting from Combinations | Ash Content of Combinations Per Cent. |
| a | Less than 1.35 | 66.8 | × | 7.68 | = | 5.13 | a only | 66.8 | 7.68 |
| b | 1.35 to 1.40 | 6.9 | × | 14.60 | = | 1.01 | a and b | 73.7 | 8.33 |
| c | 1.40 to 1.45 | 5.3 | × | 18.54 | = | 0.98 | a, b and c | 79.0 | 9.01 |
| d | 1.45 to 1.50 | 2.1 | × | 23.82 | = | 0.50 | a, b, c and d | 81.1 | 9.40 |
| e | 1.50 to 1.55 | 3.5 | × | 28.42 | = | 0.99 | a, b, c, d and e | 84.6 | 10.18 |
| f | 1.55 to 1.75 | 5.5 | × | 35.78 | = | 1.97 | a, b, c, d, e and f | 90.1 | 11.74 |
| g | Heavier than 1.75 | 9.9 | × | 55.66 | = | 5.51 | a, b, c, d, e, f, and g | 100.0 | 16.09 |
| | Raw coal | 100.0 | × | 16.09 | = | 16.09 | | | |

Note:—From the above data, the theoretically correct ash content of the raw coal is 16.09 per cent. Mr. Hancock's analysis is 15.94 per cent. a difference of only 0.15 per cent.

The raw coal was thus divided by float tests into seven parts representing materials of seven different specific gravities. The ash content of the lightest of these is 7.68 per cent. while that of the heaviest is 55.66 per cent. The percentages of these different materials are also given in Table I.

## Explanation of the Hancock Chart

In constructing the chart, a perfect square is drawn to a convenient scale, the area of this representing the total raw coal. At the left side and bottom, scales reading from 0 to 100 are laid off as shown. On the left-hand scale, the percentages of each of the materials shown in Table I are laid off and dotted lines are projected across the chart from these points. Thus, all that area within the square

between the top of the chart and the first dotted line represents the material of a specific gravity less than 1.35, while that area between the first and second dotted lines represents all that material of a specific gravity between 1.35 and 1.40, and so on through all the parts of the raw coal shown in Table I.

Using baths of the same specific gravities as used in the raw-coal tests, exactly similar float-and-sink tests are made of the washed coal and the refuse produced by the jigs.

The percentages of these several materials in the washed coal and refuse as determined by the float-and-sink tests will be in terms of the washed coal or refuse. To complete the chart, the percentages of each specific-gravity material (in terms of that material) found in the washed coal and in the refuse must be determined. Tables II and III show the way in which these figures are obtained.

TABLE No. II. TESTS OF WASHED COAL AND CALCULATIONS THEREFROM.

| A | B | | C | | D | E | F |
|---|---|---|---|---|---|---|---|
| Specific Gravity of Materials | Percentage of Each Material Obtained by Float and Sink Tests of Washed Coal. | | Percentage Relation between Washed and Raw Coal. | | Percentages in Column B Converted to Terms of the Raw Coal. | Percentage Relation of Each Material to Raw Coal. (C in Table I.) | D ÷ E Percentage of Each Material Carried by the Washed Coal. |
| Less than 1.35.... | 74.6 | × | 89.0 | × | 66.4 | 66.8 | 99.4 |
| 1.35 to 1.40..... | 7.6 | × | 89.0 | × | 6.8 | 6.9 | 98.6 |
| 1.40 to 1.45..... | 5.8 | × | 89.0 | × | 5.2 | 5.3 | 98.1 |
| 1.45 to 1.50..... | 2.3 | × | 89.0 | × | 2.0 | 2.1 | 95.2 |
| 1.50 to 1.55..... | 3.4 | × | 89.0 | × | 3.0 | 3.5 | 85.7 |
| 1.55 to 1.75..... | 4.7 | × | 89.0 | × | 4.2 | 5.5 | 76.4 |
| Heavier than 1.75. | 1.6 | × | 89.0 | × | 1.4 | 9.9 | 14.1 |
| Totals..... | 100.0 | | .... | | 89.0 | 100.0 | .... |

TABLE No. III. TESTS OF REFUSE AND CALCULATIONS THEREFROM.

| A | B | | C | | D | E | F |
|---|---|---|---|---|---|---|---|
| Specific Gravity of Materials | Percentage of Each Material Obtained by Float and Sink Tests of the Refuse. | | Percentage Relation between Refuse and Raw Coal. | | Percentages in Column B Converted to Terms of the Raw Coal. | Percentage Composition of the Raw Coal. (C in Table I.) | D ÷ E Percentage of Each Material Carried by the Refuse. |
| Less than 1.35.... | 3.63 | × | 11.0 | = | 0.4 | 66.8 | 0.6 |
| 1.35 to 1.40..... | 0.91 | × | 11.0 | = | 0.1 | 6.9 | 1.4 |
| 1.40 to 1.45..... | 1.00 | × | 11.0 | = | 0.1 | 5.3 | 1.9 |
| 1.45 to 1.50..... | 0.54 | × | 11.0 | = | 0.1 | 2.1 | 4.8 |
| 1.50 to 1.55..... | 4.81 | × | 11.0 | = | 0.5 | 3.5 | 14.3 |
| 1.55 to 1.75..... | 11.97 | × | 11.0 | = | 1.3 | 5.5 | 23.6 |
| Heavier than 1.75. | 77.14 | × | 11.0 | = | 8.5 | 9.9 | 85.9 |
| Totals..... | 100.00 | | .... | | 11.0 | 100.0 | .... |

The percentages of washed coal and refuse, as given in Column C of these tables, is ordinarily obtained by actual weights. If all the work done is correct, the totals of Columns D should equal in their respective tables the percentages of washed coal and refuse. Mr. Hancock's figures for the percentages were 89.2 and 10.8, respectively, and the correction which I made here is negligible. The totals of Columns D for tables Nos. II and III added together should, of course, equal 100. Likewise, percentages for like materials given in Column F of Tables Nos. II and III, added together, should equal 100, or the total of each material in the raw coal.

Lay off the first figure in Column F, Table III, on the upper dotted line of the chart, using the horizontal scale. Erect a vertical to the solid line at the top of the chart. Thus, all that area to the left of this line represents the material of less than 1.35 specific gravity which is in the washed coal while the area to the right represents the amount of that material in the refuse. Proceed in a similar manner with the second figure in Column F, Table III, but drop the perpendicular down only to the next dotted line on the chart. Proceed similarly for each remaining figure in Column F, Table III. When completed, cross line or shade all that area representing the refuse and the chart then clearly represents the composition of the raw coal, washed coal and refuse.

### Limiting Density

Mr. Hancock did not state just what the requirements of this plant were nor does he declare where the division must be made to satisfy the market in a demand for "good coal." He did not speak of a division for "pure coal" being made at a specific gravity of 1.35, that is, the pure coal would only amount to 66.8 per cent. of the raw coal. As this would involve a larger waste of coal than they would probably desire to sustain in that field, and as he has stated that the washed coal as produced by the jigs ordinarily contains 11.9 per cent. ash; and as, moreover, it is understood that the plant where these tests were made was in active operation and producing a washed coal suitable for the requirements of the plant, it is to be taken for granted that this figure of 11.9 per cent. ash was satisfactory. Referring to Table I, having a specific gravity exceeding 1.75, the reader will note that the combined ash content of all the materials on the previous page is equal to but 11.74 per cent., and the division between washed coal and refuse should therefore be made as shown. The specific gravity of the "permissible" bath for float-and-sink tests would, therefore, be 1.75.

Mr. Hancock's chart is certainly valuable and shows clearly just what the jigs are doing. It unquestionably would be of great assistance in locating the causes of low efficiencies of a jig or plant not giving satisfactory results. It would also be helpful in determining the exact cause why one type of jig failed to equal the efficiency of another, or exceeded it, as the case might be.

### An Efficient Washer Produces a Coal of a Given Degree of Impurity

Regarding my method of efficiency calculation presented in 1912, one of the objectionable features is that it cannot be employed for the calculation of the efficiency of a plant which is producing a washed coal with an ash or sulphur content higher than that of the float from the permissible bath float-and-sink test. The float resulting from that test will hereafter be termed "standard washed coal." Its percentage we shall describe as the "standard percentage of washed coal."

The use of that method was based entirely upon the analyses of the washed coal being within the limits placed for ash and sulphur. Again, it is certain that any variation in the washed coal must result in a certain proportionate variation in the refuse and it would, therefore, appear that a method of calculation of efficiency should be possible wherein only the washed coal need be considered and such resulting figure should indicate what the refuse is without further calculations with the refuse figures.

A commercial washery may, under ordinary circumstances, produce a washed coal of which the ash and sulphur contents are within the limits set for that plant,

yet the ash and sulphur contents of the washed coal may at times exceed these limits. Again, if the ash or sulphur or both are less than standard, such condition can only exist by virtue of a reduction in the percentage of washed coal produced under that of the standard percentage. In either case the plant is operating at a loss, as compared to standard or perfect separation and the efficiency calculation should properly indicate certain reductions in efficiency.

In reconsidering this efficiency question, I have held these features in mind and the method of calculation presented herein covers all of these conditions insofar as I have been able to determine, though others may be able to point out discrepancies.

In presenting this new method, I have used the data contained in Mr. Hancock's chart to show more clearly the application of the method. In that which follows, the ash only is mentioned, but the method applies in exactly the same manner where sulphur enters into the problem. This is fully explained in the latter part of this article.

### The Permissible Ash Content

In any coal-washing proposition, the first step is to ascertain just what is permissible as the maximum ash content of the washed coal, and this is based entirely upon the intended use of the coal, or the competition. For instance, if the washed coal is to be used in the manufacture of coke, and for good and sufficient reasons the ash in the coke cannot exceed 11 per cent., and yet such a percentage is not objectionable, and if it is known that 8 per cent. of the ash in the coal will give 11 per cent. of ash in the coke, then 8 per cent. of ash is the permissible ash content of the washed coal. Reducing the ash below that figure in such a plant causes a loss in percentage of washed coal produced, and, as previously determined, there is no gain by the reduction of ash below 8 per cent. If there is any object in a lower ash, such as an increase in the market value of the coke, then it is necessary to determine whether the valuation of the difference between the amount of washed coal produced with an ash content of 8 per cent., and that of the washed coal of a lower ash content, eliminates the increased profit of the better-grade coke. This should be one of the considerations in determining the permissible ash content of the washed coal.

In considering Mr. Hancock's washing proposition, it is assumed that all material of a specific gravity less than 1.75 is accepted as standard washed coal. The theoretically perfect separation of this coal by washing and one which would represent an efficiency of 100 per cent., is, therefore, as follows:

Ash content of the raw coal = 16.09 per cent.
Washed coal = 90.1 per cent., with ash content = 11.74 per cent.
Refuse = 9.9 per cent., with ash content = 55.66 per cent.

We have seen that Table II shows the composition of the washed coal as produced by the Stewart jigs, as shown on Mr. Hancock's chart, while Table III shows the composition of the refuse.

A permissible bath test of the washed coal would, therefore, show 98.4 per cent. float and 1.6 per cent. sink, while the same test of the refuse would show 22.86 per cent. float and 77.14 per cent. sink.

Table IV shows the calculations to determine the ash content of the washed coal and refuse, as produced by the jigs.

TABLE No. IV. ASH CONTENT IN WASHED COAL AND REFUSE

| | Washed Coal. | | | | Refuse. | | | |
|---|---|---|---|---|---|---|---|---|
| | A | B | | C | D | E | | F |
| Specific Gravity of Materials | Result of the Float-and-Sink Tests of the Washed Coal. | Percentage Ash Content of each Material. | | Percentages in Column B Converted to Terms of the Washed Coal. | Result of the Float-and-Sink Tests of the Refuse. | Percentage Ash Content of each Material. | | Percentages in Column E Converted to Terms of the Refuse. |
| Less than 1.35.... | 74.6 | × 7.68 | = | 5.73 | 3.63 | × 7.68 | = | 0.28 |
| 1.35 to 1.40..... | 7.6 | × 14.60 | = | 1.11 | 0.91 | × 14.60 | = | 0.13 |
| 1.40 to 1.45..... | 5.8 | × 18.54 | = | 1.08 | 1.00 | × 18.54 | = | 0.19 |
| 1.45 to 1.50..... | 2.3 | × 23.82 | = | 0.55 | 0.54 | × 23.82 | = | 0.13 |
| 1.50 to 1.55..... | 3.4 | × 28.42 | = | 0.97 | 4.81 | × 28.42 | = | 1.37 |
| 1.55 to 1.75..... | 4.7 | × 35.78 | = | 1.68 | 11.97 | × 35.78 | = | 4.28 |
| Heavier than 1.75. | 1.6 | × 55.66 | = | 0.89 | 77.14 | × 55.66 | = | 42.94 |
| Totals..... | 100.0 | ..... | | 12.01 | 100.00 | ..... | | 49.32 |

From Tables Nos. I, II, III and IV, it is seen that the actual washing test fell short of the theoretically perfect separation in four respects.

(1) The ash content of the washed coal is 12.01 per cent. instead of 11.74 per cent. or a difference of 0.27 per cent.
(2) The percentage of washed coal produced was 89.0 per cent. instead of 90.1 per cent. a difference of 1.1 per cent.
(3) The ash content of the refuse is 49.32 per cent. instead of 55.66 per cent. or a difference of 6.34 per cent.
(4) The percentage of refuse produced was 11.0 per cent. instead of 9.9 per cent. or a difference of 1.10 per cent.

Any variation from the theoretically perfect separation, as shown in Table I, results in a lower efficiency of washing. To make sure that this is true, regardless of the exact location of the several misplaced materials, certain assumptions are made in Table V.

TABLE No. V. EFFICIENCIES RESULTING FROM DIFFERENT ASSUMPTIONS

All Percentages are in Terms of the Raw Coal Except Those Converted as Specified

| | Combinations | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | | 4 | | 5 | | | |
| Specific Gravity of Materials | Percentages of Each Material in | | Percentages of Each Material in | | Percentages of Each Material in | | Percentages of Each Material in | | Percentages of Each Material in | | | |
| | Washed Coal. | Refuse. | Washed Coal. | Refuse. | Washed Coal. | Refuse. | Washed Coal. | Refuse. | Washed Coal. | Refuse. | | |
| | % | Ash % | % | Ash % | % | Ash % | % | Ash % | % | Ash % | % | Ash % |
| A Under 1.35 | 66.8 | 5.13 .... .... | 66.8 | 5.13 .... .... | 66.8 | 5.13 .... .... | 66.8 | 5.13 .... .... | 66.8 | 5.13 .... .... | | |
| B 1.35 to 1.40 | 6.9 | 1.01 .... .... | 6.9 | 1.01 .... .... | 6.9 | 1.01 .... .... | 6.9 | 1.01 .... .... | 6.9 | 1.01 .... .... | | |
| C 1.40 to 1.45 | 5.3 | 0.98 .... .... | 5.3 | 0.98 .... .... | 5.3 | 0.98 .... .... | 5.3 | 0.98 .... .... | 5.3 | 0.98 .... .... | | |
| D 1.45 to 1.50 | 2.1 | 0.50 .... .... | 2.1 | 0.50 .... .... | 2.1 | 0.50 .... .... | 2.1 | 0.50 .... .... | 2.1 | 0.50 .... .... | | |
| E 1.50 to 1.55 | 3.5 | 0.99 .... .... | 3.5 | 0.99 .... .... | 3.5 | 0.99 .... .... | 3.5 | 0.99 .... .... | 3.5 | 0.99 .... .... | | |
| F 1.55 to 1.75 | 1.0 | 0.36 4.5 1.61 | 2.0 | 0.72 3.5 1.25 | 3.0 | 1.07 2.5 0.89 | 4.0 | 1.43 1.5 0.54 | 5.0 | 1.79 0.5 0.18 | | |
| Over 1.75.. | 4.5 | 2.50 5.4 3.01 | 3.5 | 1.95 6.4 3.56 | 2.5 | 1.39 7.4 4.12 | 1.5 | 0.84 8.4 4.68 | 0.5 | 0.28 9.4 5.23 | | |
| Totals... | 90.1 | 11.47 9.9 4.62 | 90.1 | 11.28 9.9 4.81 | 90 1 | 11.07 9.9 5.01 | 90.1 | 10.88 9.9 5.22 | 90.1 | 10.68 9.9 5.41 | | |
| Percentage of Ash in Washed Coal or Refuse. | $\frac{11.47}{90.1} = 12.73$ | $\frac{4.62}{9.9} = 46.56$ | $\frac{11.28}{90.1} = 12.52$ | $\frac{4.81}{9.9} = 48.58$ | $\frac{11.07}{90.1} = 12.28$ | $\frac{5.01}{9.9} = 50.61$ | $\frac{10.88}{90.1} = 12.08$ | $\frac{5.22}{9.9} = 52.73$ | $\frac{10.68}{90.1} = 11.85$ | $\frac{5.41}{9.9} = 54.65$ | | |
| Efficiency of Washing Calculated by Dejameter Method | By Rule 1 77.3% | | By Rule 1 82.1% | | By Rule 1 87.6% | | By Rule 1 92.1% | | By Rule 1 97.5% | | | |

By referring to the Hancock efficiency chart, it is found that the amount of less than 1.35 specific-gravity material found with the refuse from washing is a very

small percentage (0.6 per cent.) of the total of this material carried by the raw coal. In order that the most favorable variation may be shown, or the one most likely to show as high an efficiency as is obtained in the theoretically perfect separation, it is assumed that a test of the washed coal charted on a Hancock chart shows that all of the materials *a, b, c, d* and *e*, in Table I, have gone to the washed coal where they belong, and that the variation from the theoretical occurs in part of material *f*, being found in the refuse, and that this is replaced in the washed coal by an equal amount (by weight) of the material *g*, the percentages of washed coal and refuse remaining the same as the theoretically perfect, or 90.1 and 9.9 per cent., respectively.

In Table V, this interchange of location of these materials is shown in different amounts, the results clearly indicating the effect caused thereby on the efficiency of the separations made.

It will readily be seen from the data given in Table V that any other combination that may be made, with the percentages of washed coal and refuse held to the same figures as the theoretically perfect, will result in a reduced washing efficiency, though in some instances, the reduction may be so slight as to be hardly worth consideration, yet the fact remains and should be considered in determining efficiencies. It is, of course, self-evident that any increase from the theoretically perfect percentage of washed coal will increase its ash content, and any reduction in the percentage of washed coal will decrease its ash content; except, that should there be any sink in the washed coal when tested in the permissible bath (and there always is in commercial washing), there will be a reduction in percentage of washed coal, while the ash content may remain the same as the theoretically perfect.

As an example of this, referring to Table V, suppose the washed coal is made up of materials *a, b, c, d* and *e*, and that *f* has all gone to the refuse and in place of it 3 per cent., in terms of raw coal, of material *g* is found in the washed coal. The result would be a washed coal amounting to 87.6 per cent. instead of the theoretically perfect 90.1 per cent., while the ash content of this washed coal would be 11.74 per cent., or the same as the theoretically perfect.

Table VI is made up in a similar manner to Table V, but differs in that none of material *g* is found in the washed coal, which has the effect of varying the percentages of washed coal and refuse. This again shows the decreased efficiency of washing through variations from the theoretically perfect separation.

From what has been presented, the following facts are derived:

(1) That it is impossible to reduce the ash content of the washed coal below the standard analysis except by a reduction in the percentage of washed coal below that of the standard percentage.

(2) That if the percentage of washed coal agrees with the standard percentage, the ash content will be higher than the standard ash, so long as there is any sink in the washed coal when tested on the permissible bath, and as there always is in commercial washing, it is impossible to reach the perfect percentage of washed coal and stay within the limit for ash.

(3) That a condition may exist wherein both the percentage of washed coal and its ash content will be above the standards.

From these facts and from the data contained in the tables, the following conclusions may be drawn:

To arrive at any method of stating coal-washing efficiencies in figures, which will apply universally, the composition and percentage of the refuse need have no bearing on the proposition, as it is directly affected by the variations in the composition and percentage of the washed coal. The washed coal then may be considered alone in arriving at such a method and in doing so there are four conditions affecting the efficiency. They are:

(1) If the percentage of washed coal is standard, but the ash content is above standard, then the ash analysis alone is the basis for calculating the washery efficiency.

(2) If the percentage of washed coal and also its ash content are above standard, then both of these differences are the basis for calculating the washing efficiency.

(3) If the ash analysis is standard but the percentage of washery coal is below standard, then the percentage of washed coal alone is the basis for calculating the washing efficiency.

(4) If both the ash analysis and the percentage of washed coal are below standard, then both of these differences are the basis for calculating the washing efficiency.

TABLE VI. CALCULATIONS OF EFFICIENCY WITH VARIOUS ASSUMPTIONS

All Percentages are in Terms of the Raw Coal Except Those Converted as Specified

| Specific Gravity of Materials | Combination 1: Percentages of Each Material in Washed Coal. % | Ash % | Refuse. % | Ash % | Combination 2: Percentages of Each Material in Washed Coal. % | Ash % | Refuse. % | Ash % | Combination 3: Percentages of Each Material in Washed Coal. % | Ash % | Refuse. % | Ash % | Combination 4: Percentages of Each Material in Washed Coal. % | Ash % | Refuse. % | Ash % | Combination 5: Percentages of Each Material in Washed Coal. % | Ash % | Refuse. % | Ash % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A Under 1.35 | 66.8 | 5.13 | .... | .... | 66.8 | 5.13 | ..... | .... | 66.8 | 5.13 | .... | .... | 66.8 | 5.13 | .... | .... | 66.8 | 5.13 | .... | .... |
| B 1.35 to 1.40 | 6.9 | 1.01 | .... | .... | 6.9 | 1.01 | ..... | .... | 6.9 | 1.01 | .... | .... | 6.9 | 1.01 | .... | .... | 6.9 | 1.01 | .... | .... |
| C 1.40 to 1.45 | 5.3 | 0.98 | .... | .... | 5.3 | 0.98 | ..... | .... | 5.3 | 0.98 | .... | .... | 5.3 | 0.98 | .... | .... | 5.3 | 0.98 | .... | .... |
| D 1.45 to 1.50 | 2.1 | 0.50 | .... | .... | 2.1 | 0.50 | ..... | .... | 2.1 | 0.50 | .... | .... | 2.1 | 0.50 | .... | .... | 2.1 | 0.50 | .... | .... |
| E 1.50 to 1.55 | 3.5 | 0.99 | .... | .... | 3.5 | 0.99 | ..... | .... | 3.5 | 0.99 | .... | .... | 3.5 | 0.99 | .... | .... | 3.5 | 0.99 | .... | .... |
| F 1.55 to 1.75 | 1.0 | 0.36 | 4.5 | 1.61 | 2.0 | 0.72 | 3.5 | 1.25 | 3.0 | 1.07 | 2.5 | 0.89 | 4.0 | 1.43 | 1.5 | 0.54 | 5.0 | 1.79 | 0.5 | 0.18 |
| G Over 1.75.. | ..... | .... | 9.9 | 5.51 | ..... | .... | 9.9 | 5.51 | ..... | .... | 9.9 | 5.51 | ..... | .... | 9.9 | 5.51 | ..... | .... | 9.9 | 5.51 |
| Totals... | 85.6 | 8.97 | 14.4 | 7.12 | 86.6 | 9.33 | 13.4 | 6.76 | 87.6 | 9.68 | 12.4 | 6.40 | 88.6 | 10.04 | 11.4 | 6.05 | 89.6 | 10.40 | 10.4 | 5.69 |
| Percentage of Ash in Washed Coal or Refuse. | $\frac{8.97}{85.6} = 10.48$ | | $\frac{7.12}{14.4} = 49.44$ | | $\frac{9.33}{86.6} = 10.77$ | | $\frac{6.76}{13.4} = 50.45$ | | $\frac{9.68}{87.6} = 11.05$ | | $\frac{6.4}{12.4} = 51.61$ | | $\frac{10.01}{88.6} = 11.33$ | | $\frac{6.05}{11.4} = 53.07$ | | $\frac{10.4}{89.6} = 11.61$ | | $\frac{5.69}{10.4} = 54.71$ | |
| Efficiency of Washing Calculated by Delameter Method | 3 92.1% | | | | 3 93.9% | | | | By Rule 3 95.7% | | | | 3 97.5% | | | | 3 99.2% | | | |

### Quantity of Washed Coal Standard and Ash Content Excessive

In the first condition, with the percentage of washed coal standard, if the ash content of the washed coal should be the same as that of the raw coal, then no re-

sults have been obtained, and instead, a loss has resulted equal to the percentage of refuse resulting from washing. In such case it can truthfully be said that the efficiency of washing is zero. If the ash content of the washed coal should be standard, then the washing efficiency would be 100 per cent. From this we find that the true method of calculating the efficiency for such a condition would be as follows:

*Formula A*

$$\textit{washing efficiency (condition 1)} = \frac{\textit{raw coal ash} - \textit{washed coal ash}}{\textit{raw coal ash} - \textit{standard washed coal ash}}$$

### Both Quantity of Washed Coal and Its Ash Too High

In the second condition both the percentage of washed coal and its ash content are higher than standard. It may be said, as in the first condition, that if the ash content of the washed coal is the same as that of the raw coal, the washing efficiency should be considered as zero. But the method of calculation should be applicable for use in the comparison of coal-washing machines. We can imagine two machines (a) and (b) washing the same coal and both producing a washed product having an ash content the same as that of the raw coal. But machine (a) might discharge washed coal of an amount equal to the standard washed-coal percentage, while (b) might produce a higher percentage of washed coal than (a). Thus the loss through the operation of machine (a) will be greater than that occasioned by the working of machine (b). To attain an efficiency figure to use for the comparison of these two machines under such conditions, it is, therefore, necessary to bring the percentages of washed coal into the calculations and the following would apply to such a condition:

Referring to Table I, assume that the washed coal from the jigs contains all materials *a, b, c, d, e* and *f*, and also 4.9 per cent. (in terms of the raw coal) of *g*, making a total washed coal of 95 per cent. The ash content of this mixture would be 14.47 per cent. Applying formula A only:

$$\frac{16.09 - 14.47}{16.09 - 11.74} = \frac{1.62}{4.35} = 0.3724 \textit{ or } 37.24 \textit{ per cent.}$$

If machine (a) above mentioned is producing 90.1 per cent. washed coal analyzing 14.47 per cent. ash, the efficiency would be 37.24 per cent. If machine (b) is producing (as is possible) 95 per cent. washed coal analyzing 14.47 per cent. ash, it is certainly doing better work than machine (a). Admitting that the following condition cannot exist, but for the purpose of making my contention clear on this point, it could be said that machine (b), producing 100 per cent. washed coal, with an ash content of 14.47 per cent., would have an efficiency of 37.24 per cent. by analysis and 100 per cent. efficiency by percentage of washed coal produced. The average efficiency in such case would be $\frac{100 + 37.24}{2} = 68.62$ per cent. This coincides with formula A, for in that calculation the efficiency by percentage of washed coal produced is disregarded, or would be equal to 100 per cent. To carry out this principle for the calculation of efficiency by percentage of washed coal when higher than standard, the formula *B* at the foot of the page is derived.

The formula *C* for condition 2 will also be found at the bottom of the page.

Applying this to the first above mentioned condition for machine (b):

$$\frac{\frac{95.0 - 90.1}{100.0 - 90.1} + \frac{16.09 - 14.47}{16.09 - 11.74}}{2} = 43.37 \textit{ per cent. eff.}$$

### Ash Content Standard and Washed Coal below Required Figure

In the consideration of condition 3, the ash content is standard, but the amount of washed coal produced is less than it should be, as figured by a float-and-sink test of the raw coal. It is at once evident that the only way to determine this efficiency is by a direct calculation using only the figures for the percentage of standard washed coal and the actual washed coal produced or, if the standard, washed coal is 90.1 per cent., and the actual production is 85 per cent., the efficiency would be

$$\frac{85.0}{90.1} = 0.9434 \textit{ or } 94.34 \textit{ per cent. efficiency}$$

As the ash content of the washed coal is standard, that efficiency is 100 per cent., and the true final efficiency is the average of these two, or

$$\frac{94.34 + 100.0}{2} = 97.17 \textit{ per cent. efficiency}$$

It is, of course, impossible to have a condition wherein the percentage of washed coal is standard and the ash content below standard, so that need not be considered. For condition 3, the following formula is, therefore, derived:

*Formula D*

$$\textit{washing efficiency (condition 3)} = \frac{100 + \frac{\textit{percentage of washed coal produced}}{\textit{percentage of standard washed coal}}}{2}$$

From this it is evident that Formula *E* at the bottom of the page should be used for condition 4.

In going back over these formulas, it is quite evident that conditions 3 and 4, as they will always be found in practice, will show a higher efficiency than conditions 1 and 2, which is as it should be, for a washery that is pro-

*Formula B*

$$\textit{efficiency} = \frac{\textit{percentage of washed coal produced} - \textit{standard percentage of washed coal}}{100 - \textit{standard percentage of washed coal}}$$

*Formula C*

$$\left.\begin{array}{l}\textit{washing efficiency} \\ \textit{(condition 2)}\end{array}\right\} = \frac{\left(\begin{array}{l}\textit{percentage of washed coal produced} - \\ \textit{standard percentage of washed coal}\end{array}\right)}{100 - \textit{standard percentage of washed coal}} + \frac{\textit{raw coal ash} - \textit{washed coal ash}}{\textit{raw coal ash} - \textit{standard washed coal ash}}}{2}$$

*Formula E*

$$\textit{washing efficiency (condition 4)} = \frac{\frac{\textit{ash content of washed coal produced}}{\textit{ash content of standard washed coal}} + \frac{\textit{per cent. of washed coal produced}}{\textit{standard per cent. of washed coal}}}{2}$$

ducing a washed coal with an ash content above standard is not desirable because the higher-ash coal would have to be sold at a reduced price.

On the other hand, a coal that carried ash of a lower percentage than standard might bring a higher price and the loss would be only through the reduced amount of coal produced. The maximum amount of such reduction would, as previously stated, be based entirely upon the extent to which it could be carried without eliminating the profit derived from the higher market value of the lower-ash coal. At the same time, it is impossible in actual practice to carry conditions 3 and 4 to the extremes to which 1 and 2 may be carried and the variation of a few per cent. below standard in the percentage of washed coal does not affect the efficiencies nearly as much as would a few per cent. increase in the ash content above the standard figure.

### Proposed Rules Algebraically Expressed

From the data presented, I therefore derive the following formulas for the calculation of washery efficiencies and obtain the rules for their use.

Let $X$ = efficiency of washing; $a$ = percentage of raw-coal float from the permissible bath test (standard washed coal); $b$ = percentage of washed coal produced by washing; $c$ = 100 per cent. = raw coal; $d$ = ash content of the raw coal; $e$ = ash content of the raw-coal float from the permissible bath test (standard washed coal); $f$ = ash content of the washed coal produced by washing. Then:

*Rule 1*—If the ash content of the washed coal is of a higher percentage than standard and the percentage of washed coal is standard, calculate the efficiency of washing by the following formula:

$$\frac{d-f}{d-e}$$

*Rule 2*—If both the ash content and the percentage of washed coal are of a higher percentage than standard, calculate the efficiency of washing by the following formula:

$$\frac{\frac{b-a}{100-a}+\frac{d-f}{d-e}}{2}$$

*Rule 3*—If both the ash content and the percentage of washed coal are standard or, if either one or both are less than standard, calculate the efficiency of washing by the following formula:

$$\frac{\frac{f}{e}+\frac{b}{a}}{2}$$

*Rule 4*—If the ash content of the washed coal is higher than standard, and the percentage of washed coal is less than standard, calculate the efficiency of washing by the following formula:

$$\frac{\frac{d-f}{d-e}+\frac{b}{a}}{2}$$

If, in stating the efficiency of washing, the rule by which it is calculated, is also given, it will at once be understood whether the plant is producing a washed coal product with an ash or sulphur content above or below standard.

In calculating the efficiency of washing of an entire washery, the formulas as given will apply, providing the percentage of washed coal and its ash content are derived from the entire washed-coal product of the plant. If these figures are derived from each individual jig, then the efficiency figure in each case will represent each individual jig and to determine the total plant efficiency from these figures, multiply the efficiency of each jig by its washed-coal tonnage production. Add the resulting products from all jigs together and divide by the sum of the washed-coal tonnage capacities of all the jigs.

Example:

Jig (a) Efficiency = 98.0 per cent. × washed coal tonnage or 10 tons per hr. = 980
Jig (b) Efficiency = 90.0 per cent. × washed coal tonnage or 20 tons per hr. = 1800
Jig (c) Efficiency = 86.0 per cent. × washed coal tonnage or 30 tons per hr. = 2580

60 5360

Then:

$$\frac{5360}{60} = 89.33 \textit{ per cent.} = \textit{total efficiency}$$

The following calculation gives the efficiency of the Stewart plant, represented by Mr. Hancock's chart:

Ash content of the raw coal = 16.09 per cent.; washed-coal ash = 12.01 per cent.; washed coal = 89 per cent.; standard washed coal = 90.1 per cent.; ash content = 11.74 per cent.; $a$ = 90.1 per cent.; $b$ = 89 per cent.; $c$ = 100 per cent.; $d$ = 16.09 per cent.; $e$ = 11.74 per cent.; $f$ = 12.01 per cent.

Rule 4 would apply to the conditions at this plant.

Efficiency of washing =

$$\frac{\frac{d-f}{d-e}+\frac{b}{a}}{2}$$

or,
$$\frac{\frac{0.1609-0.1201}{0.1609-0.1174}+\frac{0.890}{0.901}}{2} \textit{ or } 96.29 \textit{ per cent.}$$

If one formula could be compiled that would apply on all the conditions which may exist in washeries as herein outlined, the method of calculation would be simplified, but I have been unable to determine any such formula which would be satisfactory.

## An Automatic Continuous Coal Drier

By A. J. Sayers*

The problem of properly drying coal after washing is one which has troubled the industry for many years. It will be pleasing, therefore, to many coal producers to learn that a satisfactory coal-drying machine has been invented by C. A. Wendell. This device is fully protected by patents and the exclusive rights to manufacture and market it have been secured by the Link-Belt Co.

The machine, in general, consists of three main parts, the frame, feed-spouts and the container. There is also a sluice and a hopper. The feed spouts are fastened to an inner solid shaft and are driven by suitable transmission so that they may revolve at any desired speed independent of the container.

The container, which is driven through a hollow shaft consists of a top plate, a bottom plate provided with openings which are closed by trap doors, and an outer inclined wall. This outside wall is made up of screens with suitable perforations. Outside of these, a water col-

*Engineer, Link-Belt Co., Chicago.

lector is set and so arranged that the water which is thrown through the screens is collected and made to follow the sloping sides up to the top edge, where it is discharged by centrifugal force into a sluice to be led away. The container is driven through suitable transmission to any desired speed independent of the feed spouts.

The discharge doors in the bottom plate of the container are made to open and close automatically by means of cams attached to the revolving shaft on which the feed spouts are fastened. The material being dried is continually and automatically discharged from the container after having been kept in the machine for a time sufficiently long to give it the degree of dryness desired. It is discharged into a hopper and removed by a suitable conveying apparatus.

### Centrifugal Force Aids Discharge

The easy discharge of the material is accelerated by placing the screen at a certain slope so that when the coal is sufficiently dried and the doors in the bottom are opened, it will slide downward and out into the hopper. The centrifugal force aids in making this operation almost instantaneous.

After the machine has been put in motion and attained its full speed, the material to be dried such as coal, for instance, is fed into the spouts. The centrifugal force will then throw this coal in a steady stream against the perforated frame forming the outside of the container so that a thick bed is gradually formed as the spouts slowly pass by each and every point of the container, the spout traveling faster than the drying screen.

As the spouts slowly gain on the container, the cams which are fastened to the same shaft and thus travel at the same speed and are always in the same fixed relation to the spouts open and close the discharge doors just far enough ahead so that no material can be discharged into that part of the container which is being emptied of its contents. In other words, the distance between the cam and the spouts is just large enough to permit of a gradual opening and closing of the door before the material discharged from the spout can get into this place. This means that there is always an empty section about the size of a door opening just ahead of the spout and just behind the cam.

This empty space is continually being filled and the material to be dried has to stay in position until the cam again opens and closes the door and the then empty space is refilled from the spout which follows close behind it.

As this performance is continually repeated it will be seen that the material handled can be made to stay a longer or shorter time as needed or according to how long it takes to drive the moisture out of the material by simply changing the relative speeds beween the cams and spouts with regard to the container. A similar result may be obtained, or the dryness of the material can be adjusted by a lighter or a heavier feed.

To illustrate how long material is permitted to remain in the machine at a certain combination of speeds, let us assume that the speed of the container is 250 r.p.m., while that of spouts and cams is 251 r.p.m., one revolution per minute faster than the container. As a consequence, each discharge door is opened and closed once every minute by each cam and as two cams are used in this design, each door is operated twice per minute allowing the material to remain in the container about 25 seconds or during 104 revolutions.

This machine is self contained, strongly built with few working parts. These are subjected to but little wear on account of the relatively low speed of the revolving elements in relation to each other. All shafts are supported by babbitted, brass-bushed or ball bearings. All parts are easily accessible for inspection or replacement. The perforated screens against which the material lies while drying and which must take the wear caused by the downslide at the opening of the doors are easily replaced by simply cutting them loose and cold-riveting new parts to the heavy iron frames.

The Wendell drier is a machine which automatically receives and discharges the material and moisture it handles, and while it is intermittent in its drying action, its performance is continuous. The entire operation is accomplished by the aid of centrifugal force and gravity and no scraping or plowing devices are required. Excessive wear is thereby eliminated while the power consumption is comparatively small.

## Recent Scale Conferences

The members of the miners' scale committee of District No. 2, which comprises central Pennsylvania, met at Clearfield, Apr. 22, at 11 o'clock. The joint conference of the scale committees of miners and operators met at 2 o'clock the following day in the Dimeling Hotel.

The miners demanded that a uniform wage scale be paid for inside and outside labor, that eight hours constitute a day's work for all men employed in and around the mines, that pillars and stumps be drawn by hand and not by machine, and that local inequalities be taken up locally for adjustment, these differences including pushing of cars and compensation for removing rock in rooms, headings or breakthroughs to make necessary height. The operators refused to make any concessions. On Saturday, the miners agreed to submit the question to a referendum.

Latest reports from Peoria, Ill., on Apr. 28, state that the operators refused to grant a 4 per cent. increase demanded by the miners in the southern field.

## Bituminous Examinations

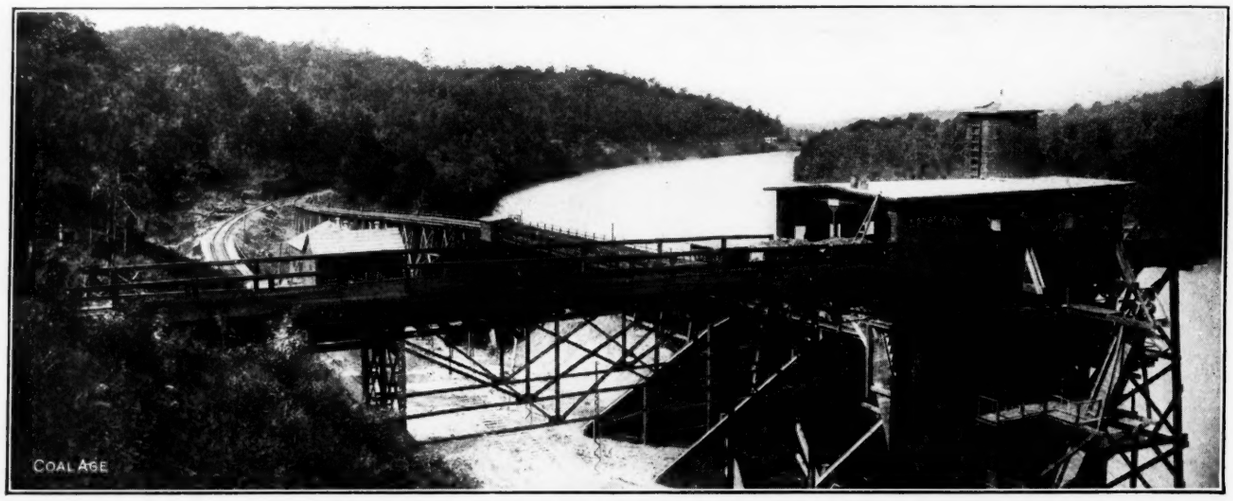
Notices are being sent out, in the several bituminous districts of Pennsylvania, announcing that examinations for certificates of competency for mine foremen, assistant mine foremen and firebosses, will be held May 5, 6, 7 and 8, 1914. In most cases, the examination for fireboss certificates is held on the last day named, May 8. Applicants for certificates must be citizens of the United States, of good moral character and known temperate habits, at least 23 years of age and must have had at least five years' practical experience after 16 years of age, as miners or mining engineers, or men of general work inside of the mines of Pennsylvania.

## Mining Meetings

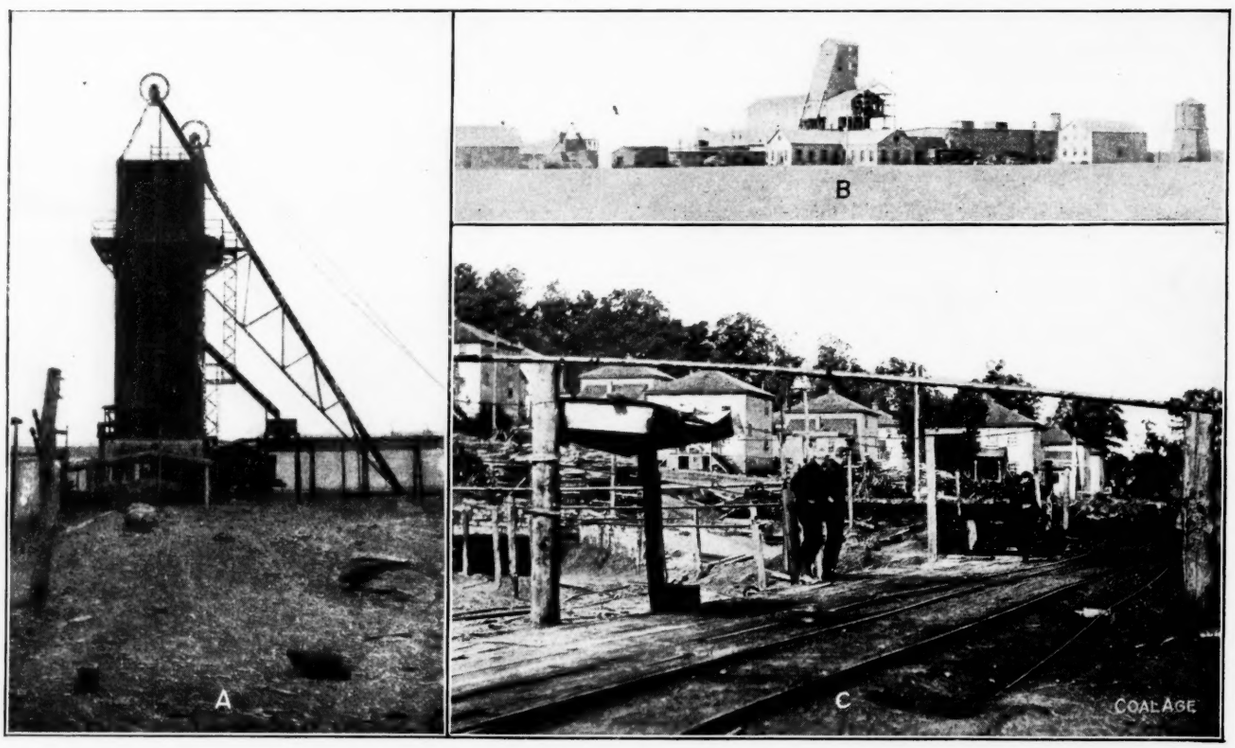
Pennsylvania Anthracite Section of A. I. M. E., in auditorium of Lehigh & Wilkes-Barre Building, Wilkes-Barre, Penn., Saturday evening, May 9.

Kentucky Mining Institute, at State University, Lexington, Ky., May 8 and 9.

# Snap Shots In Coal Mining




Coal Tipple on Warrior River at Gilmore, Ala.

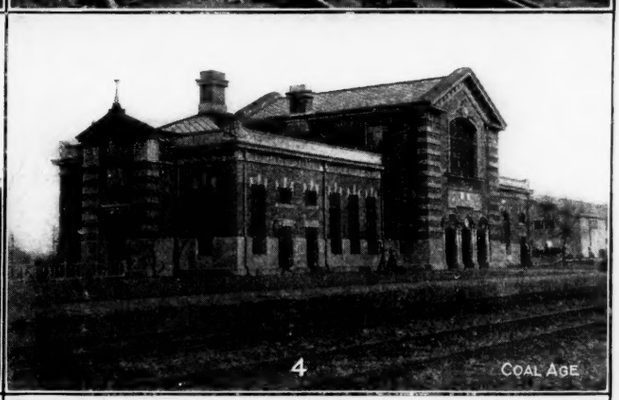


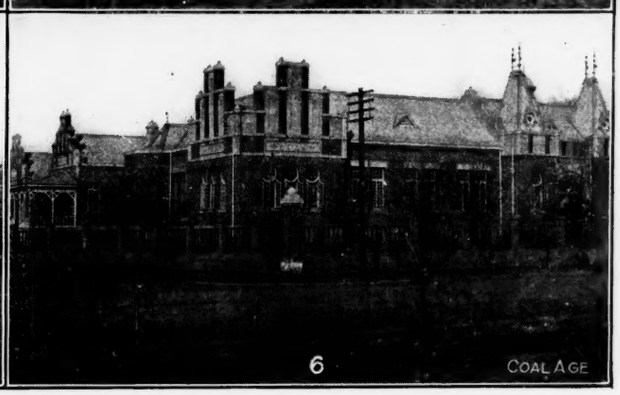

A—New Steel Tipple at No. 8 Mine of West Kentucky Coal Co., Sturgis, Ky. Chute and Drag at Lower Right Delivers Coal to Boiler Room. The Seam Is Reached by a Drift, and Mine Is Equipped with Rope Haulage. B—View of Surface Plant at Galt Mines, Lethbridge, Alberta, Canada. C—Rope Haulage at Mine No. 119, Consolidation Coal Co., Jenner, Penn. On Left Is Mouth of Mine No. 118, While Section of Town Is Shown in Background

RADIANT MINE, DRAKESBORO, KY.

TIPPLE OF GREENVILLE COAL CO., POWDERLY, KY.

# Mining Coal in Japan






1—CLUB OF FUSHIN COLLIERY COMPANY. 2—OYAMA PITS. 3—SHRINE. 4—RAILWAY STATION. 5—OFFICIAL QUARTERS. 6—COLLIERY HOSPITAL

# The Colorado Strike

*SYNOPSIS—The disturbance in Colorado has been permitted to grow until, no longer a strike, it has assumed the proportions of a war. Probably 87 persons have been killed and at least 9 plants have been burned. The State militia is without pay and consequently campaigning is hampered. Both northern and southern Colorado are affected.*

The investigation of the Colorado strike by Congress has done no good and perhaps much harm. A board of inquiry will never aid peace by allowing men to vituperate one another if, after stirring up strife, it then departs and leaves them to plant blows to match their evil words. Our courts would be a source of weakness rather than strength, if they did not adjudicate and follow up their decision with the civil power. If Congress and the President can do nothing better, let them not invite the disputants to air their grievances in a powerless court. Such action can, at least, only weaken the effectiveness of the local control.

## LUDLOW, CENTER OF VIOLENCE

The first breach of the peace in the new development of the Colorado situation occurred near Ludlow, Colo., on Apr. 20. The militia declares that a detachment of 17 soldiers under the command of Lieut. Linderfelt, which had advanced to investigate the origin of certain rifle discharges, was fired upon by strikers in the Berwind Cañon. The militiamen fled and took a position on Tank Hill, the strikers entrenching themselves at Arroyo, half a mile away.

The story told by the strikers declares that the fighting commenced with an exchange of shots between strikers and troops in the Ludlow colony. It is said by J. R. Lawson, Colorado member of the executive board of the United Mine Workers of America, that five militiamen interfered with some Greeks at their sports on Sunday the 19th. No fighting resulted, however, but on Monday the 20th, Major Hamrock, of the militia at Ludlow, sent for Louis Tikas, the leader of the Greeks, to demand of him the release of some men from the camp. Lawson says this Greek leader never returned but he declares he does not know, however, who fired the first shots.

The firing in all lasted 14 hours. Machine-gun fire was directed on the strikers' camp at Ludlow Station, which was burned to the ground. Under the tents, holes had been dug and covered with boards and there were several noncombatants caught in these shotproof pits when the camp burned. As a result of the day's engagement, it is stated that one soldier was killed, one fatally injured and one less seriously wounded. On the other hand, 14 in the strikers' ranks were killed and considerably over 20 wounded. Among the dead was the Greek leader Louis Tikas. The bodies of 11 children, two women and one man were found by a searching party of the American Red Cross on the 22nd.

The situation for the militia was quite serious, there being about 100 soldiers to about 400 armed strikers. The number of these latter was continually increasing.

## FIGHTING SPREAD ALL OVER TRINIDAD DISTRICT

On the 22nd, fighting commenced at Delagua, which is at the head of the branch railroad that runs westward from Ludlow. The guards, 15 in number, apparently went out to meet the strikers and a fight occurred about a mile from the camp. After a few minutes' fighting, the guards retreated, pursued by the strikers, who attacked them in the mine building. Militiamen in steel cars sent up from Ludlow reinforced the guards and repulsed the strikers.

The Aguilar district lies over a high range of hills in a different cañon from that in which Delagua, Hastings and Ludlow are located. Aguilar is about seven miles northeast of Ludlow. Shortly after the Delagua battle, hostilities broke out at Aguilar, and soon the strikers had 35 persons, including five women and three children, entrapped in the mine of the Empire Coal Mining Co. They set fire to the tipple house and are alleged to have dynamited the mine with bombs, sealing the exit for those who used the mine as a place of retreat. However, whether this occurred or not, all the persons were ultimately liberated or rescued.

## EIGHT PLANTS ARE FIRED

The full force of the Colorado militia was called out on Apr. 22 and ordered to mobilize at Denver and to await further orders. However, as money is lacking, it was impossible to utilize these forces to advantage. The payment of the militia was already scandalously in arrears. On the same day several union miners at El Paso, Curtis, Patterson and other union mines left Colorado Springs for Trinidad, and all the miners quit work.

The following plants were reported on fire on Apr. 23. Primrose mine of the Colorado Fuel & Iron Co. (Primrose Coal Co.) at Rugby, Mine No. 4 of the Southern Colorado Fuel Co., the Empire mine of the Empire Coal Mining Co., the Southwestern mine of the Southwestern Fuel Co., the Green Cañon mine of the National Fuel Co., and the Rugby mine of the Colorado Fuel & Iron Co. The Royal and Brodhead mines are also in ashes. In all, eight mines in the Trinidad field had been destroyed by the strikers, who comprised about 1000 men.

## THE TRUCE IN THE TRINIDAD DISTRICT

On the 24th a truce was arranged between Acting Governor Fitzgerald and Horace Hawkins, the attorney for the miners; Governor Ammons being in Washington, D. C., The state militia promised not to fire unless first fired on. The new force of militia had meanwhile arrived in the district and fearing the train might be dynamited, had detrained six miles from Ludlow and marched into that village. Part of the miners had intended to intercept the train at Lynn near Aguilar, but others desired to hold up the forces at another point. As a result of the disembarkation, and the division among the strikers, the troops met with no resistance.

The strikers withdrew from Lynn and Aguilar, and all the persons imprisoned in the Empire and Southwestern mines since the 22nd were found alive and unharmed. Several women and children who had taken refuge in the mine had been permitted by the strikers to leave on the 23rd, before the evacuation, and were escorted from the district by their captors.

## HOSTILITIES BREAK OUT EVERYWHERE

On Apr. 26 the Chandler mine, over 80 miles in a straight line northeast of Ludlow, situated in Fremont County, and being the property of the Victor-American Fuel Co., was taken by the strikers. On the 27th two companies of militiamen drove off the invaders, but a mine of the Colorado Fuel & Iron Co., known as the McNally plant, was burned down. This mine is ¾ of a mile west of Walsenburg. During the night seven mine guards were shot at the Walsen mine near Walsenburg.

On the 27th evidences of the unrest appeared at Hecla, a mine of the Rocky Mountain Fuel Co., 22 miles north of Denver and about 190 miles in a direct line from Ludlow. The mine was attacked by strikers, but none of the 49 guards was injured. A posse of 200 men was reported as speeding from Boulder to the rescue.

At the Vulcan mine, near Lafayette, there was trouble at 10:30 p.m., and for half an hour a fight was waged between miners and mine guards. The Gorman mine near Marshall was also attacked by strikers at the same hour, but machine guns on the tipple were brought into action, and the attack was repelled.

This northern field had been comparatively quiet, but when the militiamen were moved to the south to cope with the trouble there, violence developed in the sections thus vacated.

## THE PRESIDENT ACTS

On Monday, Apr. 27, a long conference was held between the President, Secretary Garrison and Senator Thomas. No decision was reached as to the advisability of sending troops to Colorado. On the previous day, Martin D. Foster, chairman of the Committee of Mines and Mining in the House of Representatives, met John D. Rockefeller, Jr., and is said to have discussed the possibility of arbitration. He declared that his mission was without result.

On the 28th President Wilson ordered three troops of the Sixth Cavalry at Fort Leavenworth, Kan., to go to Trinidad, and two troops of the Twelfth Cavalry at Fort D. A. Russell, Wyo., to go to Cañon City. He issued a proclamation urging that domestic violence cease, and in a telegram to the Governor urged that the militia withdraw.

The number of lives lost in the events just described is, at least, 87. It is likely that no accurate estimate will ever be made.

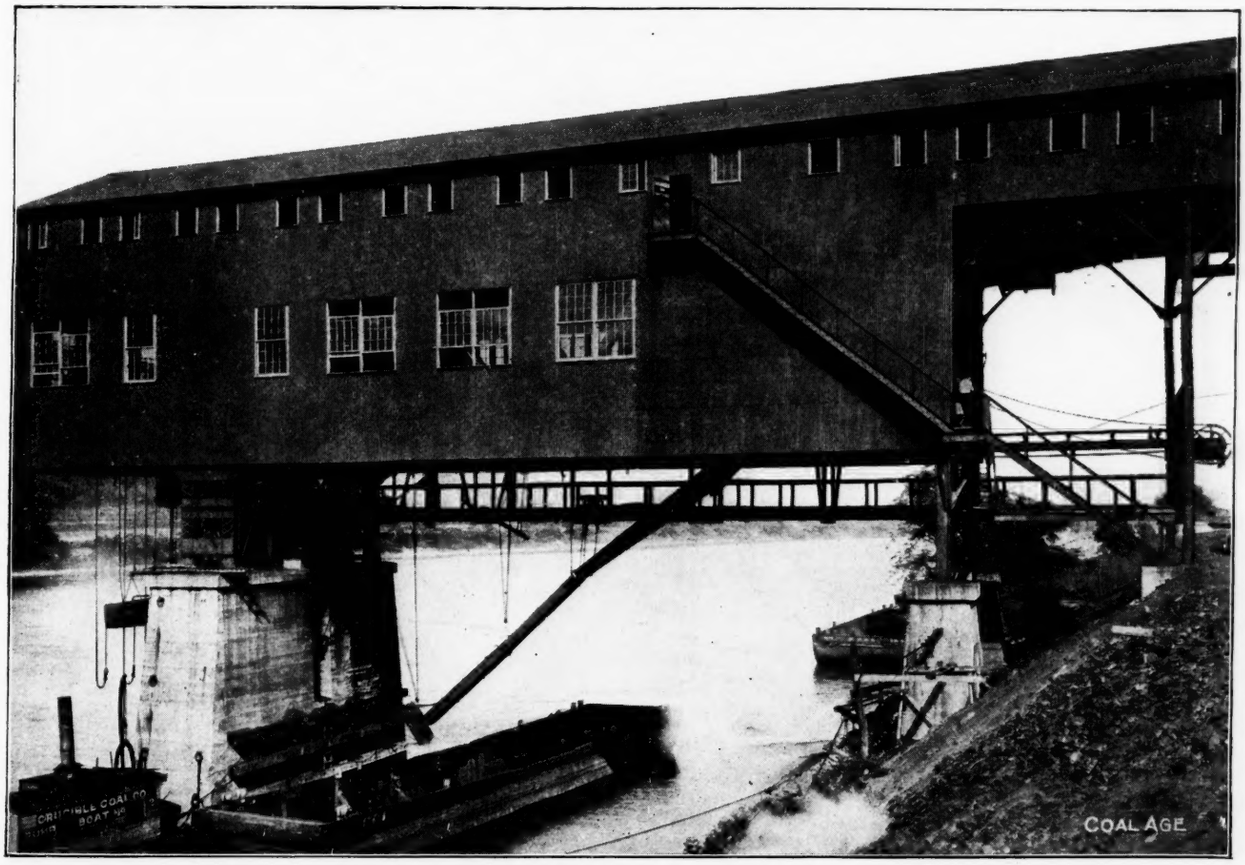
# A Preparation Plant in a River Tipple

The majority of coal mines throughout the country ship their product by rail only. In certain localities, however, particularly along the Ohio River and its tributaries, many tipples are equipped for shipping by either rail or water, and some few by water only.

ing screenings to the barges and baskets for lowering the lump.

As the structure must be above flood level, the distance to the barges is considerable at low water, and varies decidedly with the stage of the river. Hence, while the screenings may with impunity be spouted down, the lump must be lowered more carefully to avoid breakage.

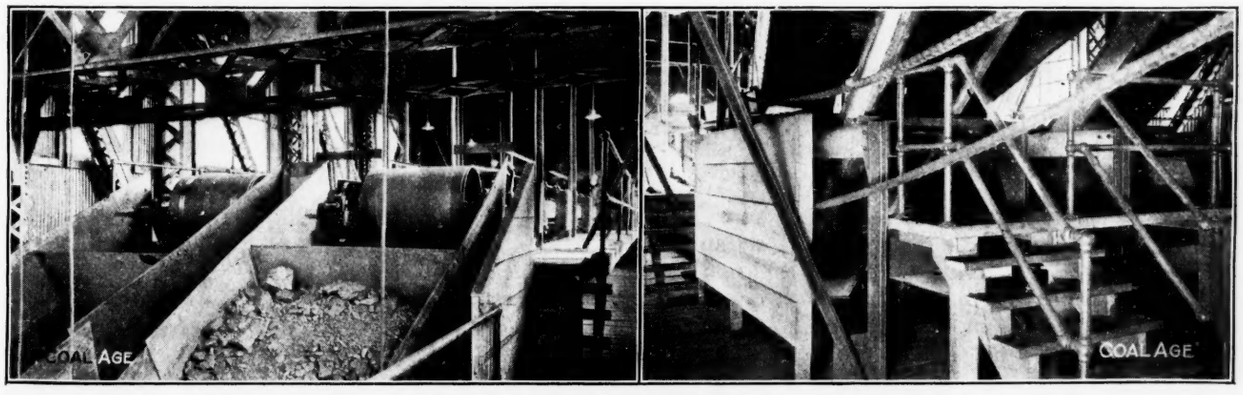
Mine cars are brought to the upper floor of the tipple




General View of the Tipple

The plant of the Crucible Coal Co., located at Arensberg, on the Monongahela River, just above Connellsville, has a tipple of the latter type. The building extends out over the river and is equipped with spouts for delivering

by electric locomotives. The plant is duplicate, that is, there are two dumps, two sets of screens and two picking belts. The fine coal passing through the screens drops into chutes below, which underneath the lower tipple



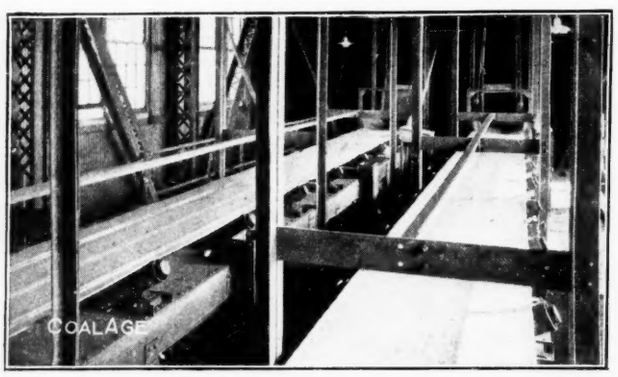

The Delivery Ends of Picking Belts, Spouts for Screenings and Lump Chutes to Picking Belts

floor unite into a single spout leading down to the barges.

The lump coal, passing over the screen, is fed onto two rubber picking belts, which pass between two files of men, who remove the bone from the product. The number of pickers is, of course, varied, according to the quality of the coal.

Each of these picking belts is 42 in. wide and runs over 34x36-in. head pulleys, and 30x44-in. tail pulleys, these being placed about 62 ft. apart on centers. Troughing idlers, placed every 5 ft., carry the upper part of the belt, while flat return idlers placed on 10-ft. centers carry the lower part. The power is applied through belts, gearing and chains, from a 60-hp. motor, which operates the entire tipple equipment. The speed of the picking belts is 60 ft. per minute, at which rate they will carry 130 tons each per hour, or 260 tons for the two.

Below the level of the picking platform and between the two belts is a third belt conveyor, running in the opposite direction. Onto this narrower belt the pieces of bone removed from the coal are chuted. This refuse is carried out of the shore end of the tipple to the bank, and discharged into pit cars for hauling away to the dump.




THE TWO PICKING BELTS, LOOKING TOWARD SCREENS

The capacity of the refuse conveyor is 60 tons per hour, thus allowing for the disposal of impurities equal to nearly one-quarter of the total tonnage handled. This is, of course, an excessive allowance, but provides capacity for handling all the bone and slate which may be removed during the most irregular feeding.

This belt is of rubber, 26 in. wide, with a thick wearing surface. The head and tail pulleys are on approximately 108-ft. centers, allowing the conveyance of refuse from the extreme outer end of the tipple to the bone track on the shore.

The head pulley of this conveyor, which travels at 60 ft. per minute, as do the picking bands, is at the shore end, the drive being accomplished by a long riveted drive chain.

The desired results are here obtained in a satisfactory and efficient manner. The market coal proceeds continuously from the mine car to the river barge, while the bone or refuse is effectively separated by hand picking, which, if carefully and thoroughly done, is the surest and best means, and returned to the shore for disposal, either to a dump or if desired, for filling. The complete installation was designed and furnished by Dempcy-Degener Co., of Pittsburgh, representing the Webster Mfg. Co., in the Pittsburgh district.

## The Eccles Explosion

A severe explosion took place, in the afternoon of Apr. 28, at Mines Nos. 5 and 6, of the New River Collieries Co. These workings are located at Eccles, Raleigh County, on the Virginian R.R. It is believed that 203 miners are entombed and perhaps none of these can be rescued alive. However, only 4 dead bodies have as yet been recovered. Fifty-nine men, all from mine No.6 , have been rescued. The two shafts in mine No. 5 were rendered useless by the explosion. One shaft in No. 6 was also so severely injured as to be unavailable for escape or rescue.

The explosion occurred in No. 5 mine and was communicated to No. 6. However, all but 13 men of those who entered the shaft at this latter mine this morning have been accounted for. The shafts are about 600 ft. deep. Apparently no smoke appeared at the mouths of the shafts.

Superintendent Thomas Donaldson, from No. 3 mine, Superintendent M. E. Kent and General Superintendent F. B. Bayles, all of the New River Collieries Co., and an expert rescue crew, were lowered down the only shaft in working order at No. 6 mine and brought up several living and four dead men.

## West Virginia Institute to Meet in Cumberland, Md.

The summer meeting of the West Virginia Coal Mining Institute will be held in Cumberland, Md., on June 2, 3 and 4. The announcement to this effect was made today by Prof. E. N. Zern, of the School of Mines at the University of West Virginia, the secretary of the organization. Prof. Zern made his announcement after the choice of Cumberland by the members of the executive committee had been confirmed by President Neil Robinson.

The invitation, which came from the business organizations of Cumberland, was received some time ago as were invitations from several cities in the northern part of the state. Cumberland was selected because of its easy accessibility and because a number of the Maryland operators and miners wanted to entertain the West Virginians.

The coming session of the Institute will be "practical." A number of interesting papers will be read on practical mining questions rather than theoretical subjects. Practical mining men from the surrounding coal-mining states will attend the Institute meeting and will take part in the proceedings. The detailed program will be announced later.

## More Wireless Telephony in English Mines

The Fife Coal Co. has introduced "wireless" telephony into its Lindsay colliery, at Kelty, in the county of Fife, Scotland. The current is carried through the rails in the gangways. Only four receivers have been installed, one in the hoist room, another at the foot of the shaft, a third at 2850, and a fourth 4950 ft., respectively, from that point. The receivers weigh about 50 lb. Each instrument has a battery of four cells, any of which will produce a current at 15 volts pressure.

# Who's Who in Coal Mining

## Robert U. Patterson

Major Robert U. Patterson, Medical Corps, U. S. A., is one of the most prominent figures in the first-aid work that is now being carried on by American coal-mining companies. Major Patterson is in charge of the first-aid department of the American Red Cross, and a considerable part of his time and attention has been taken up with the development of first-aid work in coal mining.

He was born June 16, 1877, and graduated from McGill University, Montreal, Canada, in 1898. Major Patterson was an interne in the Montreal General Hospital from 1898 to 1900. Following this, he served one year as surgeon at the coal mines of the Anaconda Copper Co., Belt, Mont.

In June, 1901, Robert Patterson was commissioned 1st Lieutenant of the Medical Corps, United States Army. He was an honor graduate of the Army medical school in 1902. He then served in the Philippine Islands until 1905, experiencing active service in the Department of Mindanao under Generals Pershing and Wood against the Moros. During this time much of his attention was devoted to combating the epidemic of Asiatic cholera in the Philippines.

He served at Presidio, San Francisco, 1905, to 1906. Was present and took part in the relief work following the earthquake and fire. After this Major Patterson served with the U. S. army in the Cuban pacification from 1906 to 1909, following which service, he was stationed in Washington, D. C., and Fort Niagara, N. Y.

From 1910 to 1913 Major Patterson acted as director of ambulance companies for the maneuver division, Fort Banks, Mass., and San Antonio, Tex. He reported for duty in charge of the first-aid department of the American National Red Cross, June 5, 1913.

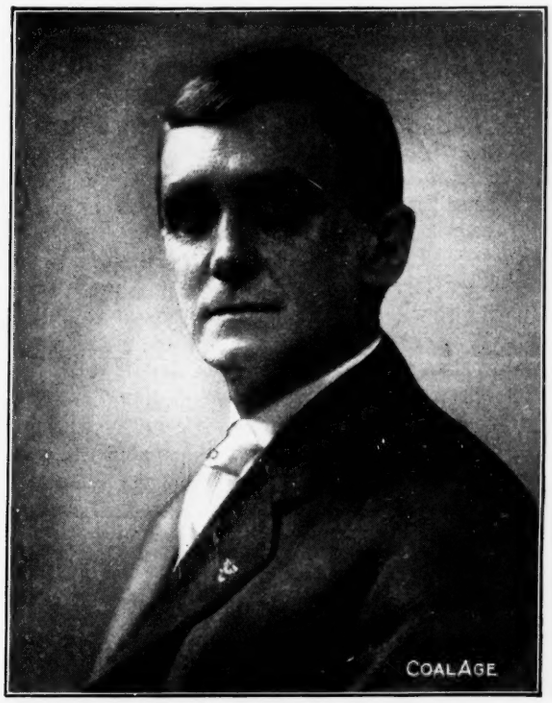
Coal men throughout the country have a warm affection for Major Patterson and appreciate in full the valuable service he has rendered the "Safety Movement" in American coal mining.

MAJOR ROBERT PATTERSON

## John Hewitt

John Hewitt, general manager of the Vandalia Coal Co., Terre Haute, Ind., is one of the live wires of mining in the middle west. Born in England in 1860, Mr. Hewitt started life in this country as a coal miner, at which occupation he worked until 1888. He had obtained a fair education in the common schools of England, and this enabled him to serve as bookkeeper for the Island Coal Co. from 1888 until 1890. In this latter year he was promoted to mine superintendent for the same company and held this position until 1905.

He severed his connection with the Island Coal Co. to become district superintendent of the Vandalia Coal Co., in Indiana, which position he held until 1911, when he was appointed general superintendent of all operations for the same concern. At the present time he is general manager of all the mines of the Vandalia company, besides serving as a director of that corporation.




JOHN HEWITT

# Editorials

## The Senate and the Railroads

We are about to make our first experiment in the national ownership of railroads. We intend to build a railroad in Alaska, and we will probably administer it in the same manner as, hitherto, such roads have always been conducted under private ownership.

A correspondent writing from Washington, D. C., tells us that the Committee on Public Lands of the United States Senate believes that an economical and adequate protection of coal lands is essential to the development of the territory and the successful construction and operation of the government railway. Consequently, the committee suggests that the government should retain control over all coal-mining operations.

For so believing and for so acting in the conduct of their own business the privately owned railroads in the United States have been haled into court, for, in public opinion, private capital may not protect itself by any such manner of prudent precaution. Many railroads have feared that rivals paralleling them up the same creek or river might give their property no reason for existence and in order to secure their share of trade, have opened mines themselves. But it is wrong, all wrong, so to do unless the trick is turned by Congress.

Congress may let the government destroy private property by every form of discrimination and profitless operation, but it will not allow private capital to build up a competitive enterprise which might starve by careful and enterprising management such public utilities as have been or are well suckled by Congressional appropriations. We cannot blame Congress for looking after the interest of the Nation. For what other purpose are Congressmen appointed? But we do blame them for so bitterly opposing private capital which has exercised only the most elementary forethought.

## The Situation in Colorado

The labor troubles in Colorado could hardly be worse and we can well understand why there has been a demand that United States troops be sent to the scene of action. No matter how responsible state troops may be, there is always possible the suggestion that they are controlled by the fear of local capitalistists or by the apprehension of the labor vote. Especially is this true at this time in Colorado, where the coal-operating concerns are large and labor organizations active, and either may well be dominant forces politically.

It cannot be said that United States troops can be controlled either by the operators or the labor element and their integrity will be less questioned because their ranks have not been recruited for the particular service they will render in Colorado, so that animus against the labor element or against the companies cannot be said to affect the quality of the personnel. Unfortunately the militia of Colorado is said to be full of irresponsible gunmen, and the people of the United States are unable to determine if malice or right judgment is back of such attacks on its integrity.

In the United States troops, which are the arm of the whole country, the people of the United States have probably as much confidence as the people of Colorado have in their militia. They are willing to remain ignorant of the cause of the trouble so long as the men on whom they rely are in charge of the situation.

It is well, therefore, for Colorado to seek that help, not so much because its militia is inadequate, but because it cannot but fear the effect of the current aspersions on its honesty of purpose. Moreover, if peace is desired, as surely it is, nothing is more sure to effect it without bloodshed than the overmastering power of the United States army.

Let us hope that no state pride, no desire for anarchy, no mere love of states' rights, no fear of injury to private political interests, will prevent the Colorado people from asking, and Washington from granting, every needed assistance in settling this disturbance.

Congressional investigations are foolish waste of time, and create worse conditions rather than better. But the United States army will see to it that harmful conditions do not continue in the territory in its charge and will achieve that which no inquiry can ever do. It will guarantee the freedom of the law-abiding people in Colorado, to work or refrain from working and to come and go without restraint. In doing so, perhaps it may be necessary to do some things for which the militia of Colorado has been unsparingly condemned, but with good reason we permit the army to do what we are chary of conceding to the militia of any single state.

We are sorry to see that the President is only sending 360 men to quiet an uprising scattered over an area of several hundred square miles and is asking that the militia disband. We have no doubt that the companies detailed to the service are sufficient to do the fighting, but the force is wholly inadequate for the policing of so vast an area, especially if the operators are asked to give up the guns with which they are defending what is left of their properties.

## Scientific Preparation of Coal

Hopelessly unscientific is the attitude of many operators to washer problems. They have never yet determined what is the percentage of ash, it will pay them best to leave in the coal. They decide that to meet the demand of the market some removal of impurities is necessary; they are aware that they cannot by any method attain to an ashless product, but they do not seriously apply themselves to the questions: How much ash may I leave in my coal? What proportion of the whole product of my mine will I then be able to sell? and What percentage of ash will enable me to secure the largest profit?

When coal is purchased by a standard specification

throughout a large part of the operator's selling field, it is possible to know just what degree of coal waste the purchaser is willing to pay for. In other fields where better coals are on the market the operator can determine for himself just what purity his coal must have, to meet competition. Better coal than that, it is not well for him to supply except at a higher price.

It seems a crime to the general public for an operator to figure just how much dirt he will sell as coal, but as the dirt is so integrally a part of his product, he would have to throw all his coal away if the public wanted an absolutely pure fuel. The purchaser who buys washed coal has in a sense to decide how much of the coal he is willing to pay the operator to discard.

It will be well for operators to read G. R. Delamater's article in this issue. Perhaps the method of determining the efficiency of washers, he there propounds, may not meet with general approval. We believe that perhaps efficiency in extracting ash should be stated separately from the efficiency in saving coal. There is no advantage in combining such figures by any such crude arrangement as summing them and dividing them by two. In some places the saving of coal is more important than the efficient removal of the ash; in other cases ash is more to be feared than coal loss. Until we know the location we cannot weight efficiencies or decide with nonchalance that the arithmetical mean gives even a reasonable result.

But we think that Mr. Delamater's paper will set the reader thinking of the technical and business questions involved even if he get somewhat weary of the figures and doubtful of their determinative value. He will learn what 100 per cent. efficiency in coal washing is, even if he never finds just what proportion of that efficiency he is obtaining in practice. He can say at least, I am losing such a percentage of coal above what the float-and-sink test determines is necessary and my ash percentage is higher than it should be with the percentage of coal I am discarding. This ability to analyze conditions is a great advance over the old hit-or-miss methods of the past.

## Absenteeism

A few years ago many of our mining corporations were directed from the nearest presentable village, usually the county seat. But that time has passed away. The center of control is now at some big city. Though the directors and the president are absentees, they naturally want to keep in touch with the mines, so they bring their general managers up to the cities also.

And they, in turn, desiring to keep posted on their work, bring the chief engineers and some other men. And if this does not happen, these men leave and return to the mines repeatedly with the rhythmic rebound of a ball, and thus lose time, expend energy and waste money in the ceaseless travel. Every man who moves cityward brings others with him or spends his time traveling in the opposite direction.

Meanwhile the mines are neglected; the human side of mining is overlooked; improvements, residences, churches, which should be built in the villages, go to the city. The uplifting effect of superior mental culture and the exhibit of refining comfort are removed to urban centers. The problem which is personified by Ireland develops uninterruptedly in the United States. The time given to the mines is short, unsympathetic and begrudged, and the consideration the mines receive is wholly financial. The whole question to the owner is whether the mines are profitable to him, or not.

The criticism of Rockefeller, Jr., in the recent Colorado investigation revealed the difficulties of absenteeism, but did not explain how it could be avoided. But much of it can and will be removed if people once realize how unfortunate a condition it creates.

## The Coal Age

Very glibly the coal men refer to this as the Coal Age, the period in which human effort is replaced by the energy of fuel and the burden of humanity is laid on the broad back of stored solar energy.

But he who would feel assured that we are in the Coal Age will do well to stay away from a coal mine and travel to some place where coal is expensive. For we who are most vociferous about the reign of coal are most deplorably lacking in the use of its energy.

Almost every ton of coal produced in the United States is loaded into mine cars by hand and much of it is double shoveled. Hardly any of the coal is drilled by machinery preparatory to shooting. A large proportion of it is still hand mined, pushed by men to the heading and hauled by mules to the tipple or at least to a parting. Dumping is usually partly performed by the strong arms of the dumpers as dump feeders are but rarely installed.

All in all, we doubt whether the mine managers are aware that this is really a Coal Age in any real sense of the word. It is true there are difficulties confronting mine managers, for the material is not brought to the machine as in a shop but *vice versa* and the factory is continually being extended and is often so poorly roofed as to be unsafe without continual care and even then the roof is so treacherous as to prohibit the use of workshop methods. But there are many mines where the roof is good and conditions favorable for installations of real mechanical efficiency. Yet even there we do not have them and, on second thought, why should we?

Very rarely, we will even risk contradiction by saying never, do we find a mechanical engineer in charge of mines. They come, these managers, from almost all lines of human endeavor except the machine shop or the department of mechanical engineering of a college. We never think of putting a machinery man in charge of a coal corporation.

No wonder we find such a slight resemblance between a mine and a factory but see instead large and rambling workings, two men or even one man to a room, no routing of work, no concentration of effort and really no adequate attempt at control.

We wonder at the cheapness of coal, yet how grossly inefficient our methods are. As we go along the aisles of a machine shop, every one is working but at a mine the hoisting engineer on a slope sometimes waits half an hour for a hoist, the dumpers are taking a meal in the middle of the forenoon as there are no cars. The motormen are waiting on the gatherers, and these in turn on the miners. Everywhere we go, a crowd of waiting, not working, men confronts us. It is all so cheerful and easy. Let us sit down now and take a smoke or a bite! After all the only place to enjoy a listless life such as David Grayson sketches is not on the country road but in the mine.

# Sociological Department

## Coal Company Makes an Exhibit of Practical Housekeeping

*SYNOPSIS—At Lambert, Penn., and Gary, W. Va., an attempt is being made to encourage a higher standard of living through training the women and children in the arts of housekeeping by a practical demonstration in a simple, but model house.*

The coal mining subsidiaries of the United States Steel Corporation have started an experiment in training their employees in practical housekeeping. Among the companies which have engaged in this work are the H. C. Frick Coke Co. and the United States Coal & Coke Co.

Some time ago, Miss Ida Tarbell, the well known publicist, introduced C. L. Close, manager of the Bureau of Safety and Sanitation of the United States Steel Corporation, to the practical housekeeping center of Miss Mable Kittredge on the East Side of New York. There is nothing pretentious in this work, only three rooms modestly furnished and they are only small rooms such as the poorer people of that section of the city inhabit.

### Not an Elaborate Experiment

But training in sanitation and housework should be done in such homes as the students are living in. At least, the excellence of such rooms should but little exceed that of those which have to be kept in order by the pupils. A little interest in better furniture and equipment may be advantageously stimulated, but on the whole, the main lesson is how to do with what the pupils already possess.

And this lesson taught by Miss Kittredge has been followed by the coal-mining subsidiaries of the United States Steel Corporation of which Thomas Lynch is president. At Gary, W. Va., and Lambert, Penn., two ordinary miner's houses were taken and fitted up. At Lambert, the H. C. Frick Co. has taken one side of an 8-roomed house and furnished the 4 rooms at an expense of $259.32, a cost of $64.83 per room. The United States Coal & Coke Co. expended, at Gary, $210.89 in furnishing a 3-roomed house at an expense of $70.29 per room.

### District Nurses Placed in Charge

The district nurses actually live in these houses and they exhibit how a house can be orderly and yet serve as a home. All the furniture was bought at the store in the vicinity of the houses equipped. The nurses show their pupils how to clean house, to cook, to sew, to take care of garbage, to clean up the yard, to plant flowers, to trade at the store, to ventilate the rooms, to take care of the sick and the babies, and teach anything which tends toward good morals.

The experiment is new, but we can easily see how it will reduce drunkenness by increasing the comfort of the houses and by providing a rival to the saloon for the possession of the earnings of the workers. It will advance the real patriotism of the families. Some people regard Americanization as the mere accepting of a new nationality, where as Americanism is better regarded as a creed, a belief of the workingman in himself, his future, his duty, his mission and his self respect. These things the practical housekeeping experiment will foster.

### The Foreign-Born Adopt Lower Scale of Living Here Than at Home

The hope animating this experiment is that the foreign-born population will adopt an American standard of living. Strange to say, it is seriously to be suspected that the alien does not live as well here as in his own country, for he looks upon the United States as a temporary abiding place, a country in which to make money to be spent at his native home.

Moreover, the spirit of the pioneer is in the wanderer and no family restraints compel him to maintain appearances. When he returns to his home in Southern Europe, you find for the first time, that he has an appreciation of good clothes and creature comforts, for he prepares to dazzle the companions of his youth by purchasing an entirely new and pretentious outfit.

We do not suppose that the United States Steel Corporation has in view its personal advantage primarily in this development. But surely, it will be no small gain to have its working men and their families healthy and happy. Work will be steadier, a better class of men will be secured, the tonnage will be increased, and the houses will be better kept.

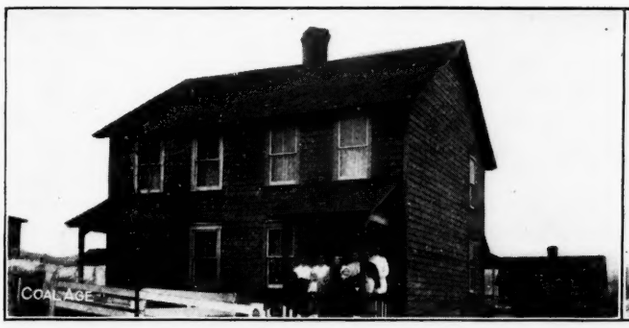
### The Work of the District Nurses

The nurses will continue their duties as general wards of the health of the towns. They will make their house-to-house visitations, instructing the mothers and children as they go. The need is indeed great. A doctor, not with the Steel Corporation, once stated that delirium tremens was not uncommon among the children of foreign miners. The men divide up their potations with the younger members of the family who are even less able than their elders to assimilate the alcohol.

It may be remarked that Miss Kittredge has written a little book on "Practical Homemaking," which is published by the N. Y. Century Co. It is a simple little book and contains no reference to what is often pretentiously called "Social Science." So much of what is published is suitable to college graduates and Chatauqua students. This book is a simple description of how to live, and there is more to learn about that than some people think.

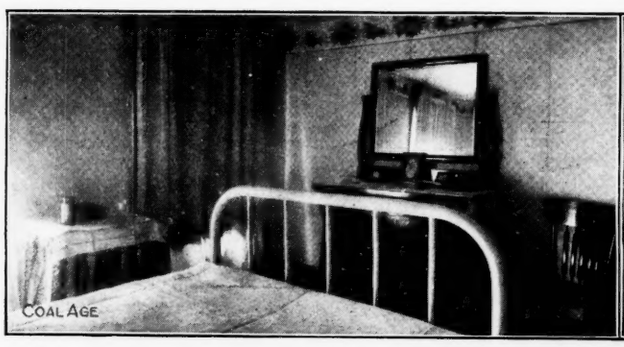
We forget how much we have already assimilated and what a large amount the more ignorant of our immigrants need to learn. Many of our cleanly habits are now no longer "reasoned" but a result of a second nature. To some of our less fortunate employees, we must use much reasoning and demonstration, to make them appreciate what we are mentally incapable of doubting.

# Practical Housekeeping Center at Lambert Mines, Penn.




A Double-House, Half of Which Is Used as a Model Home

The Rear Side of the Same House, Taken in the Winter



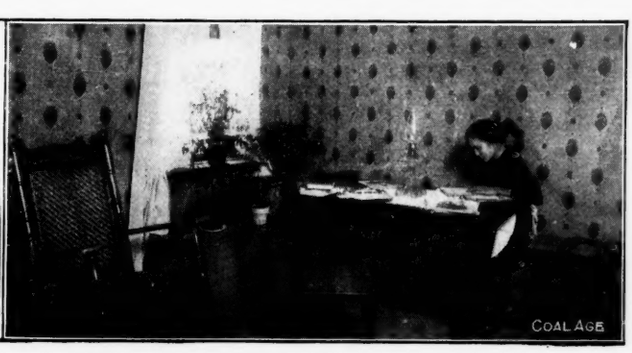

The Bedroom

The Sitting Room

Nurse Teaching Children to Cook

A Lesson in Plain Sewing

The School of Practical Housekeeping



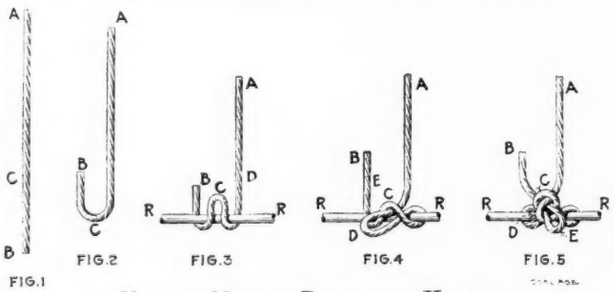

A View of the Parlor

# Discussion By Readers

## A Useful Hitch

Referring to the description of a useful hitch, given in COAL AGE, Mar. 14, p. 435, I want to describe another hitch that will serve the same purpose but permit the load to be released with greater ease, provided it is a rod or bar that cannot be slipped out of a knot. I thought this would be of interest to readers who are sometimes required to make such a hitch.

Referring to the accompanying illustration, *AB* represents the rope to which it is desired to attach a load, say




HOW TO MAKE A RELEASING HITCH

at a point *C*, Fig. 1. First make a loop at *C*, as shown in Fig. 2, and wrap the double end around the load *RR*, as shown in Fig. 3. Now, doubling the rope at *D*, insert it through the loop *C* and tighten by pulling on the end of the rope at *B*, which will give the knot shown in Fig. 4.

Finally, again doubling the rope at a point *E*, pass this through the loops *C* and *D*, in a similar manner as before, and tighten the entire knot by taking a strain on the rope *A*. The finished knot will appear as shown in Fig. 5.

To unfasten the knot and release the load, it is simply necessary to pull the end *B* of the rope, when the entire knot will fall to pieces. This knot was shown to me by an old boatman on the upper reaches of the river Thames, England. He used this knot to tie the painters of his boats to the iron rings in the wharf.

J. B. DE HART.

Coleman, Alta., Canada.

## Safety or Refuge Chambers in Mines

*Letter No. 3*—The article by Charlton Dixon, COAL AGE, Mar. 21, p. 498, drawing attention to the need of providing refuge chambers in mines, is a most important and timely subject to discuss in COAL AGE, especially at this time when "Safety First" is being so much preached, and practiced to such an extent by some of the largest coal corporations in the United States and Canada.

Personally, I believe that such refuge chambers should be provided in every coal mine that employs 50 or more men underground, and that this should be made compulsory by law, in every state or province in which coal mines are located. I advocated the installation of refuge chambers in coal mines, some time since, in an article entitled Safety First—the Slogan Cry, COAL AGE, Vol. 3, p. 190. In that article, I advised that such a station should be provided for each district in the mine and connected to the surface by a compressed-air line carried through boreholes. I suggested telephone connection with the offices on the surface, and an equipment of first-aid cabinets, stretchers, medicine chests and supplies of concentrated food packed in damp-proof cases; also electric lamp installation, rescue apparatus, compressed-oxygen cylinders and pulmotors, for use if needed.

To observe how previous disasters testify to the need and value of such refuge stations in mines, we need only to take a glance backward at the history of coal mining in this and other countries. The Courrières mine explosion that occurred in France, Mar. 10, 1906, and which was the greatest disaster in mining history, claimed the lives of practically 1200 men. There is evidence that hundreds of these men lived for days after the explosion and some of them existed for two weeks on the bark of mine timber and the putrid flesh of horses.

At the Monongah disaster, Dec. 6, 1907, which claimed 361 lives, a refuge chamber in the mine would have been the means of saving a large number of those who were lost. In that disaster, some of the men were found with their heads in the ditch, striving to obtain a breath of fresh air traveling along the floor of the entry.

At the Primero explosion, Jan. 31, 1910, when 75 lives were sacrificed, at least eleven men must have lived for hours after the disaster, since one man found with these eleven was resuscitated after hard work and lived.

At the Fernie disaster, in British Columbia, May 23, 1902, when 127 men lost their lives, 58 of these lived for 48 hours, when they finally succumbed to the gas which leaked through the stoppings.

A refuge chamber would have saved 26 men, at the Bellevue mine explosion, in Alberta, Dec. 9, 1910, when 31 men were killed, including one of the rescue party. Had such a chamber been provided in this mine, the number killed would have been reduced to five. I found 21 men lying along the ditch, at a compressed-air charging station near cliute No. 84, striving for fresh air. All of these would have been saved, had a refuge hole been available. In this disaster, eight men were rescued on the same entry, 10 hours later, at a point over 2000 ft. inby. All entrapped in the mine might have been saved, had they known that that portion of the mine was unaffected by the explosion and fled hither.

At the mine fire that occurred at Cherry, Ill., Nov. 13, 1909, where, according to the Illinois Coal Report, 267 lives were lost, written messages, several of them very pathetic, addressed to the dear ones on the surface, were found with the bodies of the victims. One of these messages showed that some of the men were conscious up to 48 hours after the fire started. The men had constructed several paddle fans, from parts of drilling ma-

chinery and pieces of boards. As stated in one message, these were made with the forlorn hope of stirring up the air, to enable them to reach the shaft. In this disaster, 21 men saved their lives by erecting a barricade or stopping in one of the entries, building it with powder cans, stones and mud. These men were rescued seven days after the fire occurred.

At Delagua, Colo., Nov. 8, 1910, there was a fire and an explosion in which 33 men were killed by the deadly gas or afterdamp and 46 by the violence of the explosion. It is probable that a large percentage of those killed by the afterdamp, could have been saved had a refuge chamber been provided in this mine. Four men were rescued seven or eight hours after the explosion occurred. These were found behind a brattice, which they had erected to keep back the afterdamp.

In the Price-Pancoast mine fire, at Throop, Penn., Apr. 7, 1911, when 73 lives were lost, it is possible that many could have been saved in a refuge chamber.

The above are only a few cases that can be produced to demonstrate the fact that many lives can be saved by providing refuge chambers to which men entrapped in the mine could retreat. I want to again urge that there should be such a provision made in every mining law.

J. W. POWELL, Supt.,
Cottonwood Coal Co.

Windham, Mont.

## The Air Factor in Mine Explosions

The article by John Verner, COAL AGE, Apr. 11, p. 603, revives the subject to which he has often drawn attention; namely, the counter-current as a strong factor in propagating a mine explosion.

In this connection, I would like to ask Mr. Verner to explain, on his theory, the effects produced by two experiments made in England and one made in France. These are No. 25, of the Altofts series and No. 263, of the Eskmeals series, in England; and No. 287, of the Liévin series, in France.

In each of these cases, an extraordinary or abnormal force was developed; but, so far as the writer knows, no lucid explanation for the phenomena observed was offered by the committee in charge of the experiment. I have suggested that "detonation" was the only possible explanation of these phenomena. I would ask Mr. Verner where he can find any evidence of a "counter-current" in the cases I have named.

The fifth report of the Explosions in Mines Committee, p. 8, says:

> The method that we have employed in our large gallery has been to use one cannon only, and to place in front of its muzzle a tube about 3 ft. in diameter and 10 ft. long, with a layer of coal dust strewn evenly along it. On the cannon being discharged into this tube a dense cloud of ignited dust is driven forward, and this displaces and ignites coal dust placed on shelves around the gallery. No air current is used.
>
> That this means of ignition produces an inflammation capable of developing into an explosion of great violence, under suitable conditions, is evident from an experiment (No. 263), in which an explosion in the large gallery was communicated, through a funnel-shaped junction, to the 3-ft. gallery strewn with coal dust (½ lb. to each linear foot).
>
> In this case the violence of the explosion set up in the small gallery was such as to rip it open at four separate places, after the flame had traveled 200 ft. down the small gallery. This experiment shows that we have at command a method of ignition of coal dust by which explosion both of moderate and of a violent character can be developed in our experimental galleries.

In experiment No. 263, coal dust was laid for 200 ft. on the floor of the large gallery, and for 400 ft. along the small gallery and at the bend joining these two galleries. I wish to direct Mr. Verner's attention, particularly, to the difference between these two experiments, quoted from the British records; namely, that in one case there was no ventilating current, while, in the other case, the ventilating current was present; but explosion developed in both cases.

Many authorities claim that a dense cloud of coal dust is necessary to produce an explosion; but later experiments have shown that so little as 0.023 oz. per cu.ft. of air is quite sufficient to propagate an explosion. This quantity is so slight that it cannot be detected with the naked eye. It remains yet to be proved that inert dust will prevent the extension of an explosion, to the degree that its advocates claim. On the other hand, the fresh coal dust continually arising from cars in transit and floating in the mine air will, in most cases, amount to more than the amount stated above (0.023 oz. per cu.ft. of air) as necessary to produce explosion.

In closing, permit me to say that I do not recall a single case of mine explosion where the explosive combustion of suspended dust occurred under conditions restricting the power of the "reverse impulse" to induce a strong draft of dust-laden air moving in an opposite direction to that of the flame. In the cases I have mentioned, the speed of the explosive wave must have been far too great to allow of the operation of a reverse impulse such as Mr. Verner suggests.

JAMES ASHWORTH, Mining Engineer.
Vancouver, B. C., Canada.

## Gasoline Motors in Mines

In view of the fact that much has been written regarding the advantages of gasoline motors in respect to mine haulage, I think it would be well to discuss or draw attention to some disadvantages of this class of locomotives for use in coal mines. It seems strange that many writers in dealing with this subject seem to attach little importance to the discharge of the engine as vitiating the mine air. It has even been advocated that these motors be used on intake haulage roads. In my own experience, as mine inspector, I have only come into contact with one instance where gasoline motors were employed in the mine. I regard them as a nuisance, because of the pollution of the mine atmosphere by the exhaust gases of combustion. The trouble and danger are greatly aggravated by the use of a poor quality of gasoline, or by a defective engine, resulting in the incomplete combustion of the gasoline. In one instance, I recall, when the air was badly fouled in the entry, only three of the four cylinders of the engine were working, with the result that the gasoline from that cylinder was vaporized without being consumed and exhausted into the air. Complaints, in this mine, were numerous, although there was 2000 cu.ft. of air in circulation, per ton of weight of the motor, which is double the allowance stated in the Article, COAL AGE, Vol. 4, p. 979.

MINE INSPECTOR.

———, Ill.

## Fan Ventilation

Referring to the discussion in regard to the installation of a 6-ft. disk fan to improve the circulation in a mine ventilated, at the present time by a 12-ft. centrifugal fan producing 80,000 cu.ft. of air per min. under a 3.5-in. water-gage, COAL AGE, Apr. 18, p. 658, permit me to ask:

Assuming the above circulation is insufficient and that it is suggested to install a 6-ft. disk fan on the other side of the mine from the present fan, both fans to work in parallel, while ventilating separate sections of the mine but using the same return air course for a distance of one mile; if the resistance of the return air course is, say 1.5 in. water gage and the 6-ft. disk will only produce 1.2-in. water gage, will these fans work successfully together? I have never seen a 6-ft. disk fan, in operation at a mine, produce over 1.2-in. water gage.

I have in mind an instance where an 8-ft. disk fan was installed to improve the circulation in a mine, under similar conditions to those suggested by Mr. Hopkins, except that, instead of one main-return airway, both fans discharged into an upcast shaft 80 ft. deep; but this plan did not work successfully.

CONSTANT READER.

Punxsutawney, Penn.

When two fans are operated in parallel, that is to say, both fans blowing or both exhausting, there is no reason why the installation should not be effective, to the extent of the capacity of each fan. As stated previously, COAL AGE, Mar. 28, p. 539, it is always necessary, in such case, to balance the respective circulations. It is also necessary not to expect or demand a greater service of either fan than that of which it is capable. For instance, Constant Reader here assumes that the resistance of the return airway used in common by both fans will equal a 1.5-in. water gage, and states that the 6-ft. disk fan to be installed will only produce a 1.2-in. water gage, which, if true, would not be a successful installation.

The statement on p. 539, relating to the capacity of a disk fan, should read 50,000 cu.ft. per min., against a water gage varying from 1 to 1.5 in. For the same power driving the ventilator and allowing for a decrease in efficiency when working under a higher gage, it might be assumed that the 6-ft. disk fan would circulate, say 20,000 cu.ft. of air against a water gage of 3 in., which would make due allowance for the resistance of the section of mine ventilated by this fan, in addition to the assumed resistance of the main-return airway. Whether or not this quantity of air would be sufficient for the ventilation of that section would depend wholly on the conditions in the mine in question.

# Study Course in Coal Mining

BY J. T. BEARD

### The Coal Age Pocket Book

**Dividing by 10, 100, 1000, Etc.**—To divide a whole number by 10, 100, 1000, etc., point off as many places from the right of the number as there are ciphers in the divisor. Thus,

$$52{,}687 \div 100 = 526.87.$$

To divide a decimal number by 10, 100, 1000, etc., move the decimal point as many places to the left as there are ciphers in the divisor, prefixing ciphers, if necessary, to complete the number. Thus,

$$145.675 \div 10 = 14.5675$$
$$3.463 \div 100 = 0.03463$$
$$0.025 \div 1000 = 0.000025$$

DECIMAL EQUIVALENTS OF FRACTIONS

| Fraction | Decimal | Fraction | Decimal | Fraction | Decimal | Fraction | Decimal |
|---|---|---|---|---|---|---|---|
| 1/64 | 0.015625 | 17/64 | 0.265625 | 33/64 | 0.515624 | 49/64 | 0.765625 |
| 1/32 | 0.03125 | 9/32 | 0.28125 | 17/32 | 0.53125 | 25/32 | 0.78125 |
| 3/64 | 0.046875 | 19/64 | 0.296875 | 35/64 | 0.546875 | 51/64 | 0.796875 |
| 1/16 | 0.0625 | 5/16 | 0.3125 | | 0.5625 | 13/16 | 0.8125 |
| 5/64 | 0.078125 | 21/64 | 0.328125 | 37/64 | 0.578125 | 53/64 | 0.828125 |
| 3/32 | 0.09375 | 11/32 | 0.34375 | 19/32 | 0.59375 | 27/32 | 0.84375 |
| 7/64 | 0.109375 | 23/64 | 0.359375 | 39/64 | 0.609375 | 55/64 | 0.859375 |
| 1/8 | 0.125 | 3/8 | 0.375 | 5/8 | 0.625 | 7/8 | 0.875 |
| 9/64 | 0.140625 | 25/64 | 0.390625 | 41/64 | 0.640625 | 57/64 | 0.890625 |
| 5/32 | 0.15625 | 13/32 | 0.40625 | 21/32 | 0.65625 | 29/32 | 0.90625 |
| 11/64 | 0.171875 | 27/64 | 0.421875 | 43/64 | 0.671875 | 59/64 | 0.921875 |
| 3/16 | 0.1875 | 7/16 | 0.4375 | 11/16 | 0.6875 | 15/16 | 0.9375 |
| 13/64 | 0.203125 | 29/64 | 0.453125 | 45/64 | 0.703125 | 61/64 | 0.953125 |
| 7/32 | 0.21875 | 15/32 | 0.46875 | 23/32 | 0.71875 | 31/32 | 0.96875 |
| 15/64 | 0.234375 | 31/64 | 0.484375 | 47/64 | 0.734375 | 63/64 | 0.984375 |
| 1/4 | 0.25 | 1/2 | 0.5 | 3/4 | 0.75 | 1 | 1. |

For the sake of illustration, the following example is given, showing two methods of operation.

**Example**—Reduce the fraction 1/64 to a decimal.

**Solution**—Annex decimal ciphers to the numerator and divide by the denominator, continuing the operation as far as desired, or until the division is complete. Thus,

```
64)1.000000(0.015625
   64
  ---
  360
  320
  ---
   400
   384
   ---
   160
   128
   ---
   320
   320
   ---
```

A shorter method is to divide by any simple factors of 64, by short division; thus,

```
8)1.000
 ---
8)0.125000
 ---
0.015625
```

### The Coal Age Pocket Book

When the division is complete and there is no remainder the decimal expressed by the quotient is the exact equivalent of the original fraction; otherwise the value of the decimal is only approximate.

#### PERCENTAGE

The term "percentage" is derived from the Latin words "per centum," meaning, by the hundred. This is abbreviated in English and written "per cent."

The expression indicates a certain rate or proportion referred to 100, and any given percentage, therefore, expresses the number of parts in one hundred or the parts per hundred.

**How Written**—Percentage, expressing hundredths, is usually written numerically as a decimal; thus, 3 per cent. (3/100) is written 0.03; 15 per cent., 0.15; 40 per cent., 0.40; 2½ per cent., 0.025, etc.

**Illustration**—The return-air current, in a certain mine, contains, say 5 per cent. of gas. This means that in each 100 volumes of the current, there are 5 volumes of gas. The gas, therefore, forms 5/100 of the total volume of the current. If the current measures 100,000 cu.ft. per min. the quantity of gas is

$$0.05 \times 100{,}000 = 5000 \text{ cu.ft. per min.}$$

Again, a certain slope road in a mine, has a grade of 12.5 per cent., which means that the slope dips 12½ ft. in each 100 ft. of its length. If the length of the slope is 2000 ft. the total dip or fall is

$$0.125 \times 2000 = 250 \text{ ft.}$$

In other words, the elevation of the mouth of the slope is 250 ft. above that of the foot of the incline.

**Example**—What quantity of marsh gas is being generated in a mine when the return-air current measures 60,000 cu.ft. per min., and a careful test made in that airway shows 2.3 per cent. of gas is present in the current?

**Solution**—The quantity of gas carried in the return-air current is

$$0.023 \times 60{,}000 = 1380 \text{ cu.ft. per min.}$$

**Example**—How much air will be required to be circulated in the mine, in the last example, to reduce the percentage of gas in the return airway to 1.5 per cent.?

**Solution**—The volume of gas generated in the mine is 1380 cu.ft. per min. If this is 1.5 per cent. of the circulation, the latter must be

$$1380 \div 0.015 = 92{,}000 \text{ cu.ft. per min.}$$

**Example**—In the same mine mentioned in the two previous examples, what would be the percentage of gas in the return airway if the circulation was suddenly reduced from 60,000 to 40,000 cu.ft. per min.?

**Solution**—Assuming that the quantity of gas given off in the mine remains unchanged, the percentage of gas, after the circulation was reduced would be

$$\frac{1380 \times 100}{40{,}000} = 3.45 \text{ per cent.}$$

# Inquiries of General Interest

## Mine Resistance in Fan Ventilation

I would like to have the following questions answered in COAL AGE:

1. What effect has mine resistance on the water gage produced by a ventilating fan?

2. Is it not possible for a mine-ventilating fan to develop the same water gage when running at a high speed and discharging into the open atmosphere, that it would if made to discharge into the mine?

3. In my opinion, the speed of the fan and not the mine resistance, governs the water-gage reading. Is this correct?

4. Assuming that a ventilating fan, substantially built and 25 ft. in diameter, produces 250,000 cu.ft. of air per minute, against a 3-in. water gage, at a speed of 70 r.p.m.; is it not possible to double the capacity of this fan, so that it will produce 500,000 cu.ft. per min., by increasing the speed of the fan?

5. Will a fall of such size as to reduce the area of the main-return airway in a mine 75 per cent., be indicated by the water gage in the fan drift showing an increase of pressure?

P. H. DEVERS.

Nanticoke, Penn.

We will endeavor to answer these questions in the order in which they are asked:

1. For the same speed of the fan, any *increase* in the resistance offered by the mine airways to the passage of the ventilating current, is accompanied by a corresponding increase in the water-gage reading in the fan drift; and, likewise, any *decrease* in mine resistance is accompanied by a corresponding decrease in the water-gage reading.

2. There will be, practically, no water-gage reading when a fan discharges directly into the open atmosphere, whatever the speed of the fan, assuming, of course, that the fan is blowing. It should be remembered that whether the fan is blowing or exhausting, the water-gage reading is due to and caused by the resistance of the mine to the passage of the air current. This resistance is sometimes called the "drag" of the air. If this resistance is cut off, the water-gage reading drops at once to practically zero, whatever the speed of the fan. (Beard's Ventilation of Mines, Introduction and pp. 42 and 96.)

3. The speed of the fan governs the water-gage reading *only* by increasing the circulation in the mine and thereby increasing the mine resistance. But, the speed of the fan cannot be said to "govern the water gage," inasmuch as when there is no mine resistance there is no water gage produced, though the speed of the fan be kept constant or even increased.

Properly speaking, *the fan operated at a given speed creates what the mine resistance causes.* The operation of the fan gives velocity to the air, which develops a certain resistance in its passage through the mine, depending on the velocity of the current. This resistance, per unit of sectional area in the fan drift, is measured by the water-gage reading. It is for this reason that the same fan, running at the same speed, produces different water-gage readings, at different mines, according to the quantity of air such mine will pass under a given water gage. The product of the two factors, *quantity* and *pressure*, determines the *power on the air* and is the proper index of the capacity of the fan.

4. It is generally assumed that the volume of air in circulation, in fan ventilation, is proportional to the speed of the fan. By this rule, a fan producing 250,000 cu.ft per min., at 70 r.p.m., would produce 500,000 cu. ft. per min., at a speed of 140 r.p.m., assuming the conditions in the mine remain unchanged. As a matter of fact, however, the *efficiency* of the fan decreases as the speed increases, but not in the same proportion.

Practically, the fourth power of the speed of the fan varies as the fifth power of the quantity of air in circulation, for the same mine or airway. In other words, the fourth power of the speed ratio is equal to the fifth power of the quantity ratio. By this rule, the above fan would produce at 140 r.p.m. about 435,000 cu.ft. per min., in the same mine or airway. To produce 500,000 cu.ft. per min. or double the previous circulation, would require, by the same rule, a speed of 166.5 r.p.m., owing to the decrease in the efficiency of the fan at the higher speed.

5. Assuming the fan is exhausting, a fall in the main-return airway of such size as to reduce its area 75 per cent. or, say from 60 to 15 sq.ft., would certainly add to the resistance of the mine. As a result, for the same power applied to the fan shaft, the fan would run a trifle faster, which, however, would hardly be appreciable; but a smaller circulation of air would be produced under an increased water gage.

In case the fan was blowing and the same fall occurred in the main-return airway, the circulation would be partially blocked, as before; but, in this case, the mine intervenes between the fan and the obstruction; and, as a result, the increase in water gage might be less than in the previous case, owing to greater leakage of air under the increased pressure.

## Height of Barometer in Millimeters

Kindly state what is the normal height of the barometer, at sea level, in the metric system.

X.

Shenandoah, Penn.

The universally adopted standard reading, for the normal height of the mercurial barometer at sea level, in the metric or French system, is 760 mm. This is equivalent to a height of $760 \times 0.03937 = 29.92 +$ in., in the English system.

In accurate calculations, all barometer readings are reduced to "standard readings," which assume a temperature of 0° C., or 32° F. of the mercury column.

# Examination Questions

## Mine Manager's Examination Held at Springfield, Ill., April 20, 1914

*Ques.*—Commencing at the southwest corner of a piece of land and running a line 1720 ft. north, thence east, 2650 ft.; what will be the length of the remaining side of this piece and how many acres will it contain?

*Ans.*—This piece of land lies in the form of a right triangle, the third or remaining side being the hypotenuse, and its length is

$$\sqrt{2650^2 + 1720^2} = 3159.25 \text{ ft.}$$

Since there are 43,560 sq.ft. in an acre, the number of acres in this piece is

$$\tfrac{1}{2}\ (2650 \times 1720) \div 43{,}560 = 52.32 \text{ acres.}$$

*Ques.*—How many tons of coal are there in the above piece of land, the coal seam being 6 ft. thick and the specific gravity of the coal 1.26, allowing 27 cu.ft. per ton of coal in place, and 35 per cent. for waste in mining?

*Ans.*—The cubic contents of this seam underlying the tract of land described in the previous question, when the thickness of the coal is 6 ft., is

$$\tfrac{1}{2}\ (2650 \times 1720) \times 6 = 13{,}674{,}000 \text{ cu.ft.}$$

Allowing 27 cu.ft. per ton of coal in place and 35 per cent. for waste, making 65 per cent. of the coal mined as lump coal, the weight of coal mined on this basis is

$$0.65\ (13{,}674{,}000 \div 27) = 329{,}188+ \text{ tons.}$$

The specific gravity of the coal does not, in this case, enter the calculation, since the weight of the coal is given as a ton per cubic yard.

*Ques.*—The total rubbing surface of a square airway being 160,000 sq.ft., the length of airway, 5000 ft.; if the quantity of air passing is 80,000 cu.ft. per min., what is the velocity of the air current, in feet per minute?

*Ans.*—The perimeter of this airway is found by dividing the total rubbing surface by the length of the airway; thus, $160{,}000 \div 5000 = 32$ ft. The airway being square, the length of one side is $32 \div 4 = 8$ ft.; and the sectional area of the airway is $8 \times 8 = 64$ sq.ft. The quantity of air in circulation being 80,000 cu.ft. per min., the velocity of the air current is $80{,}000 \div 64 = 1250$ ft. per min.

*Ques.*—How many cubic yards are there in a rectangular shaft 360 ft. deep, 12 ft. long and 6.5 ft. wide? What will be the cost of excavating this shaft at $1.93 per cubic yard?

*Ans.*—The sectional area of the shaft is $12 \times 6.5 = 78$ sq.ft. The cubic contents is then $78 \times 360 \div 27 = 1040$ cu.yd.

The cost of excavating this shaft at $1.93 per cu.yd. is $1040 \times 1.93 = \$2007.20$.

*Ques.*—What horsepower will be expended in circulating 20,000 cu.ft. of air against a mine pressure of 1.75 lb. per sq.ft.? If the quantity of air is increased to 30,000 cu.ft. per min., what will be the horsepower?

*Ans.*—The horsepower of the first circulation is found thus,

$$H = \frac{Qp}{33{,}000} = \frac{20{,}000 \times 1.75}{33{,}000} = 1.06 \text{ hp.}$$

To increase this circulation in the same mine will require an increase of power in proportion to the cube of the quantity. In other words, the power ratio is equal to the cube of the quantity ratio. The required horsepower, in this case, is

$$H = 1.06\left(\frac{30{,}000}{20{,}000}\right)^3 = 1.06\left(\frac{3}{2}\right)^3 = \frac{1.06 \times 27}{8} = 3.57 \text{ hp.}$$

To circulate the larger quantity of air (30,000 cu.ft. per min.) against the same water gage (1.75 lb. per sq.ft.) will require the power to be increased in the same ratio as the quantity, or half again as much power; thus, $1.06 \times \frac{3}{2} = 1.59$ hp.

*Ques.*—In what time can an engine of 40 effective hp. pump 4000 cu.ft. of water from a depth of 430 ft.?

*Ans.*—Since 1 hp. is equal to 33,000 ft.-lb. per min.; and, the weight of 1 cu.ft. of water being 62.5 lb., the time required, in this case, is

$$\frac{4000 \times 62.5 \times 430}{40 \times 33{,}000} = 81.4 \text{ min.}$$

*Ques.*—What is the breaking strain and safe working load of a good steel hoisting rope 1⅜ in. in diameter?

*Ans.*—The breaking strain of a crucible-steel, 6-strand, 19-wire, hoisting rope is 39 tons; and, since the strength of rope increases with the square of the diameter, the breaking strain of a 1⅜-in. rope of the same kind is

$$\text{Breaking strain} = 39 \times 1.375^2 = 73.73 \text{ tons.}$$

Assuming a factor of safety of 5, which is common practice in moderately deep shafts, the safe working load for this rope is $73.73 \div 5 = 14.75$ tons

*Ques.*—A sample of firedamp taken from the mine is found to have a specific gravity of 0.9; what are the proportions of the mixture?

*Ans.*—Assuming that this mixture contains only pure mash gas ($CH_4$) and air, and indicating the percentage of gas in the mixture by $x$, the specific gravity of the gas referred to air being 0.559, the relative weights of gas and air, in 100 parts of the mixture, are as follows:

$$\text{Gas} = 0.559\,x$$
$$\text{Air} = 1\ (100 - x)$$

The total relative weight of 100 parts of this mixture is, therefore, $100 - x + 0.559\,x = 100 - 0.441\,x$. The relative weight of the same volume (100 parts) of air is $100 \times 1 = 100$. Since the specific gravity of the mixture is equal to the ratio of the relative weights of equal volumes of the mixture and air, we have

$$\frac{100 - 0.441\,x}{100} = 0.9$$

and

$$x = \frac{100 - 90}{0.441} = 22.67 \text{ per cent.}$$

The proportion of gas in this mixture is, therefore, 22.67 parts in 100 parts of the mixture; or there are 22.67 parts of gas to 77.33 parts of air, or one part of gas to 3.41 parts of air.

# Coal and Coke News

## Washington

In the advanced rate case before the Interstate Commerce Commission during the hearing on Monday, Apr. 27, exhibits were filed on behalf of the Pittsburgh Coal Co. dealing with the financial condition of railroads in the eastern territory over a period of 16 years. It is claimed that the gross returns of the transportation companies in 1913 were the largest in their history. The charge was made that the increase of these revenues last year over 1912 for all roads exceeded $131,000,000, or more than 10 per cent. The Pennsylvania Lines show an increase of nearly $40,000,000, or 11 per cent.; the New York Central Lines more than $32,000,000, or nearly 12 per cent.; and the Baltimore & Ohio Lines more than $9,000,000, or about 10 per cent.

The exhibits seek to argue that, contrary to the belief of the public, it has not been the increase in wages to employees, but the large increase in expenditures for maintenance of equipment and way and structures that is primarily responsible for the railroads' claim of reduced net earnings. One of the exhibits shows that the principal expense item consisting largely of wages bears a less proportion to the total operating expenses in 1913 than for any single year since 1898; that maintenance of equipment bears a larger proportion to total operating expenses than for any single one of the 16 years preceding, and maintenance of way and structures a larger proportion in 1913 than for any year since 1907. The exhibits show that the two principal items of maintenance expenses have increased enormously over any preceding year and that if these expenditures had not been so unusually large in 1913, the railroads would have been able to show for that year larger net earnings than for any previous year.

On the question of increased wages which the railroads have emphasized in their campaign for an increase in rates, the exhibits show for all the Pennsylvania Lines that in 1913 less than 50c. out of every dollar of operating expenses went for transportation-traffic expenses, the latter item consisting most largely of wages to employees. This 50c. was the lowest of any single year since 1898. For the New York Central Lines nearly 54c. out of every dollar spent in 1913 went to the transportation and traffic item, this amount being the lowest since 1906; and for the Baltimore & Ohio Lines this item in 1913 showed also 54c. out of every dollar of operating expenses, being the lowest since 1908 with the exception of 1910.

In contrast with this wage item of operating expenses, the exhibits show the encroachment of maintenance of equipment and of way and structures upon the total operating expenses of these large systems. In 1913, for every dollar spent for operating expenses by the Pennsylvania Lines, 44c. went to these two maintenance items, exceeding any other single year since 1900; for the New York Central Lines the same general statement is true since 1906, maintenance in 1913 absorbing 43c. out of every dollar. For the Baltimore & Ohio Lines, in 1913, the two maintenance items also required 43c. out of every dollar, being exceeded in only four of the preceding 16 years.

One conclusion that seems inevitable from an examination of these statistics and diagrams is that the question before the Commission, instead of being one of insufficient revenues, or one of increase in rates, is really a question of its approving of these unusual maintenance expenditures by the roads. If these largely increased maintenance expenditures are approved by the Commission and are justified as normal it would seem that an increase in rates might naturally follow; that if this approval is not forthcoming, then it would seem that the increased gross earnings of the railroads in the Eastern territory are more than sufficient for the normal needs of the carriers provided their maintenance expenditures are kept within bounds. The question of these unusual expenses for equipment and way and structures promises to become overshadowing.

### HARRISBURG, PENN.

The belief now exists here that the Interstate Commerce Commission will not order a rehearing for the industrial railroad lines which were denied joint rates with other railroads under a recent order. The Commission issued an order in January that the industrial railroads were not entitled to the proportion of the through rate they had been getting, and ruled that such a division amounted to a rebate.

There has been no positive assurance as to what the commission will do, but it is generally understood that the attitude is taken that the industrial railroads have had ample opportunity to present their side of the case without a rehearing. The consensus of opinion is that the order of the Commission will stand.

Shippers depending upon the industrial railroads, other than those controlling the short lines, are complaining that the new arrangement has resulted in serious discrimination against them. With their through rates cancelled, it will be necessary for the industrial lines to increase their tariffs, thus making the through rate much higher than heretofore.

The Consolidated Coal & Coke Co., which has its mines located along the Union R.R., has already filed a complaint with the Commission, declaring that the new tariffs of that line are such that it is impossible for the coal company to compete with the other coal operators of the Pittsburgh district. Because of the new rates the mine has been closed and the miners thrown out of employment.

The Consolidated Co.'s mine is located in Allegheny County and it is expected that other coal operators along the Union, the Monongahela Connecting and other industrial railroads will file a similar protest.

The industrial lines protested vigorously against being denied a share of the through tariffs with the trunk lines, but the commission has so far refused to modify its order.

The other initial lines are fearing under the operation of the Interstate Commerce Commission's order inhibiting monetary allowances in the guise of through rate divisions to certain terminal railroads, notably the Union, Monongahela Connecting and the St. Clair in the Pittsburgh district, the Wabash-Pittsburgh Terminal is suffering acutely, not having received any freight from any of the three industrial lines mentioned since the first instant, when the commission's order became effective. Practically, the only access to the tonnage producing concerns of this district for the Wabash-Pittsburgh Terminal is by way of the rails of one or the other of the terminal lines in question.

### PENNSYLVANIA

#### Anthracite

**Shamokin**—Five hundred men and boys at the Hickory Swamp Colliery operated by the Susquehanna Coal Co., recently went on strike because some non-union men reported for duty.

**Pottsville**—Four men were killed at the Pine Hill Colliery recently, when the cage in which they were ascending upset and they were dashed to the bottom of the shaft 400 ft. below. The men were all foreigners. It is believed that the cage struck some obstruction.

**Mahanoy City**—Masked robbers invaded the workings of the Mahanoy City colliery on the night of Apr. 25, and at the point of pistols robbed a driver boy of his two weeks' pay amounting to $24. The robbers planned to rob the men on the night shift who received their pay on the above date, but the plan miscarried.

**Girardville**—McTurk Colliery suspended operations on Apr. 25, to remain idle for three months while a new slope is being sunk and old workings are being reopened, throwing 300 employees out of work.

**Hazleton**—Six hundred union miners recently struck and tied up the Hazle Colielry because 12 men did not pay their back dues for reinstatement into the United Mine Workers. The Lehigh Valley Coal Co., on Apr. 23, closed the operation indefinitely. A "button strike" is also threatened at Beaver Brook.

**Harrisburg**—Steps are to be taken early in May by the Auditor General's Department to prepare the way for collection of the state tax on anthracite coal in case the constitutionally of the statute of 1913 should be upheld. Practically all of the hard-coal operators in the state have filed reports of their output for 1913 and these will be used as a basis for calculation of the tax, the coal consumed in operation of mines and from washeries being excepted. The de-

partment is estimating the taxes on corporations which failed to file their reports for 1913.

**Shenandoah**—Fire on Apr. 25 destroyed the Indian Ridge colliery boiler house containing 10 boilers, and for a time threatened an oil house and a powder magazine close by, containing 500 kegs of powder and a large quantity of dynamite.

### Bituminous

**Pittsburgh**—Six suits were entered in the United States District Court, Apr. 24, against the Monogahela River Consolidated Coal & Coke Co., by women whose husbands were killed in an explosion in the Cincinnati mine of the above company on Apr. 23, 1913. In each case damages are asked to the amount of $10,000.

**Canonsburgh**—The Hazel mine of the Pittsburgh-Buffalo Co. recently resumed operations after being idle since Apr. 1. The miners at first demanded being paid on the run-of-mine basis, but later voted to return to work even though this proposition was refused.

**Du Bois**—No result followed the joint conference of operators and miners of District No. 2 in Clearfield, on Apr. 25. The miners have, however, decided to submit the question of signing the 1912 scale to a referendum vote of the district. If the scale is accepted work will be resumed at once.

**Summerville**—It was recently announced that Mines Nos. 5 and 6 of the Pennsylvania Coal Corporation would reduce operations to three days per week until further notice. It is expected that this arrangement will cause a number of men to seek employment in other fields.

### MARYLAND

**Frostburg**—While leaving the Ocean No. 1 mine of the Consolidation Coal Co. on the evening of Apr. 21, four miners were killed by a fall of slate. It is reported that a driver heard the roof breaking and called to the men to get out of the entry. This they were, however, unable to do.

### WEST VIRGINIA

**Bluefield**—The annual meeting of the West Virginia Medical Society will be held in this city May 13-15 inclusive, and will be made the occasion of an exceptional program calculated to attract the population of the Pocahontas coal field and surrounding sections. Contests in first-aid work will be a special feature of the program, and many valuable prizes have already been donated.

**Charleston**—Because Superintendent Sandberg, of the Dorothy mine of the Four States Coal Co., refused to participate in the joint meeting of the miners and operators recently held in this city, 500 miners laid down their tools.

A deadlock resulting from the attempt to agree upon a wage scale for the coming year, the joint scale committee of miners and operators for District 17 adjourned on Apr. 24. All efforts are being made, however, to reach an amicable settlement shortly without a suspension of work.

### TENNESSEE

**Whiteside**—The New Etna Coal Co. is making plans for improving its transportation facilities so as to shorten its six mile haul from the mines. The company has located Etna blacksmith coal in a tract of 400 acres and is prospecting extensively, at the same time making continued improvements in equipment and operation.

### KENTUCKY

**Hawesville**—Test holes are being drilled by S. H. Allen and D. G. Duncan, who have leased the farm of J. B. Adams and adjoining properties, which are known to lie over veins of good coal. As soon as the operators agree on the best location for the sinking of a shaft work of developing the mine will be pushed forward. It is the plan of Mr. Allen and Mr. Duncan to have operations under way by early fall.

**Louisville**—Local coal operators and agents are participating in bidding advertised for by the Mississippi River Commission and the United States Engineer's office in St. Louis, the total requirements making some 50,000 tons, for river shipment.

**Bridgeport**—The power house of the Barton Coal Co. at this place was destroyed a few nights ago by a fire of mysterious origin. The damage was considerable.

### OHIO

**New Straitsville**—Taylor, Williams & Jenkins closed a lease with Henry Watkins and Albert Groff whereby the latter secure a large tract of coal lands in the Whippoorwill Valley. It is the intention to develop the property during the summer.

**Columbus**—The conference of operators and miners which was in session in Columbus for four days adjourned sine die Friday, Apr. 24, without arranging a wage agreement. In fact the indications for an immediate settlement of the wage scale apparently were rather remote at the time of the adjournment of the conference.

The proposition of the miners, calling for a scale of 49.64c. per ton for machine-mined coal on the mine-run basis was rejected by the operators on the ground that it was entirely too high and they could not afford to pay that scale.

Just before adjourning a resolution was adopted giving the operators and miners in the various subdistricts of the state power to agree upon a scale for the subdistrict if possible. It was stated by several eastern Ohio operators that a settlement of the wage scale in certain subdistricts of that part of the state might be effected on the Pittsburgh basis of 64.64c. for pick mining and 44.76c. for machine mining, mine-run basis.

### INDIANA

**Indianapolis**—According to reports made at the International headquarters, Apr. 25, the action of the Policy Committee of the United Mine Workers of America was upheld in the recent referendum. This means that the bituminous coal miners of the country will continue at work wherever possible pending the negotiations of the new wage contract.

**Lafayette**—The Public Service Commission of Indiana has lowered the freight rate from the Linton and Brazil coal fields to this city from 70c. to 65c. a ton. It issued an order about a year ago to this effect but the railroads petitioned for a rehearing and they were given a chance to arrange the controversy. They failed and the new tariff goes into effect May 10.

**Sullivan**—Among suits recently filed here against coal companies is one for $10,000 damages against the Vandalia Coal Co. by Hugh Houston because of injuries received from falling slate in the Superior mine and another against the same company for $5000 by John Dono for loss of a thumb while spragging a loaded car in the same mine. Robert Dixon sues the Gregory Coal & Mining Co. for $10,000 because of injuries received in a gas explosion in the old Shelburn mine.

**Petersburg**—The Hartwell mine property in Pike County near here has been sold by the receiver to D. J. Mackay & Co., Evansville, Ind., for $198,750. There are three shafts, four miles of railroad and 2438 acres of coal land on which is the town of Hartwell, with 300 inhabitants. The mines are electrically equipped. The new owners will spend $10,000 in getting them ready for operation and employment will be given to 300 miners

### ILLINOIS

**Johnston City**—An extension is being built to the main line of the Illinois Central, south of here, connecting with the mine of the Johnston City Coal Co This will give this mine the Chicago & Eastern Illinois, Missouri Pacific, and Illinois Central R.R. for its outlet.

**Springfield**—Governor Dunne has appointed as members of the State Mining Investigating Committee: Wm. Hall, Springfield, vice W. E. Walker, Pawnee; R. J. Wilson, Marissa, vice Robert E. Locke, Johnston City, and John Tuttle, Harrisburg, vice Thos. R. Davis, Kewanee.

**Royalton**—The Franklin Coal & Coke Co. has plans for the erection by July 1 of a rescreening plant at its No. 1 mine.

**Chicago**—The creditors of the Standard Washed Coal Co. recently filed an involuntary petition in bankruptcy. The petitioners are the McComber-Whyte Co., the Hoplin-Benedict Co., and Logan A. Coleman.

### ARKANSAS

**Fort Smith**—Competitive contests between teams from the various coal-mining camps in District No. 21, embracing Arkansas, Oklahoma and Texas, for proficiency in mine rescue, first aid and other phases of the Safety First movement, will be held during the early part of May, the date being not yet decided upon.

**Clarksville**—It is reported that the works of the Scranton Anthracite Coal Co., at Montana, will in the future, be operated with non-union labor. It is expected that the mine will be opened about June 1. This is one of the largest operations in this section of the state and employs several hundred men.

### OKLAHOMA

**Lehigh**—During the month of March the mines of the Folsom-Morris Coal Mining Co. produced 53,000 tons of coal. This is the largest amount ever produced in these mines in one month. It is anticipated, however, that within a year these mines will be turning out coal at the rate of a million tons per annum.

## PERSONALS

Job Freeman, one of the largest and best known operators in the Indiana bituminous field, has been nominated for treasurer of the state by the Republicans.

John I. Absalom, ex-state mine inspector of Montgomery, W. Va., has been made general superintendent of the Coalbell Coal Co., at Scotford, W. Va. He is a well known and popular mining man.

W. O. Garvin was made president of the Trenton (Mo.) Coal & Mining Co. at the annual election recently. Other officers are H. F. Hoffman, vice-president; G. M. Wolz, secretary, and W. E. Austin, treasurer.

C. H. Nesbitt, of Birmingham, Ala., and K. F. Webb, of Walker County, have just been reappointed chief mine inspector and associate mine inspector, respectively, by Governor O'Neal for a term of three years.

Harry Brown has been appointed mine foreman at the Hazel Mine of the Pittsburgh-Buffalo Co., at Canonsburg, Penn. He was formerly assistant mine foreman at the Francis mine at Burgettstown under the same company.

M. H. Boyer, division sales manager of the McAlester (Okla.) Fuel Co., with offices at Kansas City, has resigned after ten years' service with the company. He has been succeeded by C. H. Hightower, former general sales manager of the company.

John C. C. Mayo, the Kentucky millionaire coal operator who has been seriously ill at the Jewish Hospital in Cincinnati for some weeks, was removed to New York for special treatment recently, the private car of Senator Watson, of West Virginia, specially fitted up for the journey, being used.

C. D. Caldwell, of Cincinnati, Ohio, who recently received a promotion to the position of general manager of the Pittsburg & Buffalo Co., was presented a few days ago with a handsome silver-mounted cane by his associate members of the Coal Table of the Business Men's Club, in honor of his rise.

W. S. Newcomb, secretary of the Southwestern Intertsate Coal Operators' Association, underwent an operation at St. Marys Hospital, Kansas City, on Apr. 25 for hernia. Mr. Newcomb withstood the shock well and was reported resting easily. He has an excellent chance of recovery, though it will be at least six weeks before he is able to resume work.

Edward C. Mahan, of Knoxville, Tenn., vice-president and general manager of the Southern Coal & Coke Co., and president of the Southern Appalachian Coal Operators' Association, is quite ill with typhoid fever. The annual meeting of the association, to have been held Apr. 24, was postponed indefinitely on that account.

## CONSTRUCTION NEWS

**Clearing, Ill.**—The Chicago & Western Indiana R.R. plans to build large coal docks at Clearing. The yards when completed are expected to be the best equipped in the country.

**Jellico, Tenn.**—Operations are expected to begin this summer on the erection of the new government building here, which, among other uses, is to house the mine-rescue work offices for east Tennessee.

**Greensburg, Penn.**—The Delmont Gas Coal Co. will shortly begin the development of a tract of land which it controls near here. E. M. Gross is president and James H. Gallagher is secretary and treasurer.

**Penny, Ky.**—In connection with the opening of new coal-mining operations in Pike County, Ky., John Smith and others have contracted for the building of some 600 houses for the use of miners and their families.

**Hazard, Ky.**—R. F. Peters and others who recently leased 800 acres of coal land near Mason, in Perry County, expect to begin construction of spur tracks, tipples, etc., immediately, with the hope of beginning operation by the middle of the summer.

**McAlester, Okla.**—The Rock Island Coal Co. has begun work on two new shafts near McAlester, Okla., and will spend about $1,000,000 during the summer. Steel tipples, the latest screening devices and electrical appliances will be features of the new mines.

**Hartley, Ky.**—It is expected that the Long Fork Coal Co. will begin a big coal development on Long Fork by June 1. It is the purpose of this firm to spend several million dollars in the work, and the building of a five-mile branch of the Baltimore & Ohio will be necessary.

**Viper, Ky.**—The Mason's Creek Coal Co. expects to start at once a good-sized coal plant to be reached by a short-line spur from the Lexington & Eastern R.R. The initial work will be started about May 1 and the company proposes having a daily capacity of from 15,000 to 20,000 tons.

**Chattanooga, Tenn.**—A coking plant to be located at the foot of Walden's Ridge is to be built by a syndicate represented by C. E. James, who is just back from New York, where he is understood to have made arrangements for financing the enterprise. Plans, it is declared ,are being prepared for the plant.

**Martins Ferry, Ohio**—The Rail & River Co. has been making improvements for the last year, and is now taking advantage of the shutdown in order to hurry these forward. Work has been started on a tipple at the No. 3 mine and steel for this structure has already begun to arrive. An extra force of men has been put on and still others will be set to work in the near future.

**Sturgis, Ky.**—The West Kentucky Coal Co. is building a large tipple, coal chute and watering station opposite, Granger, west of here, for the accommodation of the Illinois Central trains. The cost of the improvements will be about $15,000. In this connection the West Kentucky Coal Co. has just let contracts for improvements and additions to its office building here involving an expenditure of about $13,000.

**Johnstown, Penn.**—Contractors Sheesley & Janney, of Johnstown and Baltimore, have started work upon the opening of a big coal operation in East Wheatfield Township, Indian County, for the Conemaugh Smokeless Coal Co. The contract involves the sinking of a 200-ft. shaft and the excavation of a slope 950 ft. in length. It is anticipated that work will be sufficiently advanced by Jan. 1 next to allow the shipping of coal.

**Nesquehoning, Penn.**—Work has been commenced on a big washery and the huge culm bank between this place and Hauto will be removed by the Lehigh Coal & Navigation Co. This culm bank will be passed through the washery, after which the coal will be run through the breaker and the marketable fuel removed. It will require some years to remove the culm bank, and this operation will somewhat change the topography of the country.

**Dunlap, Tenn.**—A crew of civil engineers recently began to survey a route for the proposed railway from this point to the coal lands of the Chattanooga Iron & Coal Corporation in Brush Creek Gulch. The construction of this railway has long been contemplated by the Chatanooga firm, the purpose being to augment the company's coal resources by opening the Brush Creek Gulch tract. Construction of this railway will afford employment to a large number of laborers, and may last for more than a year.

**Jackson, Ky.**—The Wolf Valley Coal Co., of Roosevelt, has awarded a contract to T. J. Turner, manager of the Jackson Plumbing and Machine Supply Co., for all work in his line in the building of a new mining town in Breathitt County, Ky. First of all a sewerage system is being laid out in the city, yet to be christened. The town will contain 40 miners' homes, a clubhouse, a manager's residence and the usual other buildings. An electric plant will furnish power and light and all the coal from the mines to be developed will be handled in a huge modern tipple.

## NEW INCORPORATIONS

**Terre Haute, Ind**—W. L. Bogle & Co., coal operators, have increased their capital stock $40,000.

**Peru, Ind.**—The Island Creek Coal Co. has filed notice of dissolution with the secretary of state.

**Dover, Del.**—The International Mines Development Co. has been incorporated with a capital stock of $3,000,000. Joseph W. Curtin, of New York, is one of the principal incorporators.

**Fargo, N. D.**—The Dakota Lignite Mines Co., of Dickens, has been incorporated with a capital stock of $200,000. The incorporators are W. L. Richards, Hanson E. Smith and Henry Truelsen.

**Hamilton, Ala.**—The South Brilliant Coal Co. has been organized with a capital stock of $10,000 by A. A. Griffith, George H. Parker and O. S. Goodwyn. Machinery has already been purchased to develop the mine.

**Savannah, Ga.**—The South Atlantic Coal Co. anticipates raising its capital stock to $100,000. Provision is also made that no stockholder shall dispose of his holdings to an outsider without first offering it for sale to stockholders.

**Fairmont, W. Va.**—The Miners' Appliances Co. has been organized to manufacture machinery of various kinds. The capital stock is $5000 and the incorporators are George G. Brobet, C. T. Shinn, John J. Wright, J. J. Mulvehill and C. W. Mulle, all of Fairmont.

**Huntington, W. Va.**—The Ellington Co. has been organized to operate coal mines and kindred business in Illinois. The capital stock is $25,000 and the incorporators are Frank Ellington, G. D. Miller, S. J. Hyman, J. K. Oney and W. H. Cunningham, all of Huntington.

**Pittsburgh, Penn.**—The Pittsburgh-Henderson-Standard Coal Co. has been organized to operate in western Kentucky. The capital stock is $20,000 and the incorporators are Thomas J. Lattimer, E. McClintock, H. Williams, W. T. Tharp, Jr., and W. C. Smith, all of Pittsburgh.

## INDUSTRIAL NEWS

**Dixon, Ky.**—The Ruckman Coal Co. has recently installed an extensive line of improved haulage equipment, which will result in increasing the output of the mines, near here.

**Toronto, Ont.**—According to a recent estimate made by John J. Stirling, chief mining inspector for Alberta, the average payroll per day of the Alberta coal-mining industry during 1913 was $28,708, or $8,612,490 for the year.

**Middlesboro, Ky.**—F. D. Hart, Jr., has purchased of Oaks & Sharp the coal mine they operated near here under the name of the Home Mining Co. He will operate it in connection with the Mingo Coal Yards, which he also purchased from J. D. Yarborough.

**Uniontown, Penn.**—Following the word that the Carnegie Steel Co. has blown out two stacks in the Pittsburgh district the H. C. Frick Coke Co. put 1200 coke ovens out of blast. The Southern Connellsville Coke Co. is also considering blowing out all of its ovens.

**Pittsburgh, Penn.**—As a result of the opening of navigation on the Great Lakes there is a somewhat heavier shipment of lake coal over the Cleveland, Lorain & Wheeling Division of the Baltimore & Ohio. Practically all of this fuel is from West Virginia mines.

**Salt Lake City, Utah**—The 108th meeting of the American Institute of Mining Engineers will be held in Salt Lake City, Utah, Aug. 10-14 inclusive. Twenty-five papers are already in the hands of the secretary, and have been accepted for this meeting, and an interesting program is assured.

**Charleston, W. Va.**—In the Kanawha County Circuit Court, H. J. Smarr, of Charleston, was recently appointed receiver for the Mecca Colliery Co. holding mines on Morris Creek. No statement of the company's finances was made public but the receiver was appointed upon the petition of creditors.

**Rockwood, Penn.**—Hitchman Bros., who optioned a 600-acre tract of coal land in Milford Township, have been successful in securing an extension of 60 days on all the leases covering the field. They expect within this time to have made a thorough test and be in a position to commence work should they decide to purchase.

**Johnstown, Penn.**—The coal under the Singer tract in Conemaugh Township, about two miles east of Johnstown, consisting of 260 acres, was sold recently to a syndicate of local people headed by James Suppes, Jr., for $90,000. This price per acre is believed to be the record for bituminous coal outside the Connellsville field.

**Boston, Mass.**—Fire, on Apr. 22, destroyed a large empty coal pocket on the Mystic River in East Summerville. This pocket was owned by the Boston & Maine R.R. and leased to Dixon & Eddy, Boston merchants, who do a commission business in coal. Only the direction of the wind prevented drawbridge No. 8 from catching fire. The loss is estimated at $25,000.

**Pittsburgh, Penn.**—The annual meeting of the Mine Inspectors Institute of the United States of America will convene in Pittsburgh, June 9-12 inclusive, with headquarters at the Seventh Avenue Hotel. All members of the institute and all state mine inspectors of this country and the provincial inspectors of Canada are urgently requested to attend the meeting.

**Kingston, Ontario**—At the present session of the Canadian Parliament the government was asked why contracts were given last year for American coal for the Intercolonial R.R., which is a government institution, rather than to Canadian firms. The answer was made that the American coal could be procured at a more reasonable figure and with a quicker delivery.

**New Orleans, La.**—The quartermaster's department in this city, recently received instructions from Washington to secure estimates on the amount of coal in port and the facilities for coaling a fleet of transport ships in case of war. It was found that there was 160,000 tons of Pittsburgh coal on hand in addition to approximately 100,000 tons of Alabama coal at the several yards.

**Pocahontas, Alta.**—The Jasper Park Colliers, Ltd., of Alberta, which has for some time had a mine in operation at Pocahontas, on the south side of the Athabasca River is making another opening on the north side of the river, close to the main line of the Canadian Northern Ry., and shipments are expected shortly. The coal measure is 8 ft. in thickness of a high-grade bituminous.

**Washington, D. C.**—The Senate Naval Committee recently ordered a favorable report on Senator Tillman's resolution for an investigation of freight rates on coal shipped to Southern ports for the use of the navy. This action followed charges that the Southern Railway directorate was being used by the so called coal trust in discriminating against South Atlantic states in coal freight rates.

**Springfield, Ill.**—Sarah E. Finley, recently filed suit as administratrix in the circuit court to recover $10,000 from the Spring Creek Coal Co. for the death on Jan. 29, of Hugh Finley, who was killed by falling down a shaft. It is alleged that the company was careless in allowing a fireboss to run the cage to the bottom as Finley prepared to push a car upon it, supposing that it was where he left it, at the top.

**Pittsburgh, Penn.**—A statement by the Pennsylvania R.R. of the coal and coke carried over the line east of Pittsburgh and Erie for the month of March, shows an increase in bituminous coal over the corresponding month of last year. The total is 4,740,313 short tons, being an increase of 690,066 tons. The total from Jan. 1 to Mar. 31 is 12,414,492, or an increase of 296,745 tons as compared with the same period of last year. Both coke and anthracite coal show a decrease.

**Pittsburgh, Penn.**—The Federal Government has inaugurated a "flying squadron" for use in the coal fields for the relief of miners in case of accident. The initial equipment which has been delivered to the Bureau of Mines is a 1½-ton automobile truck, equipped complete with pulmotors, oxygen helmets, medicine, first-aid supplies, etc. It is anticipated that similar vehicles are to be stationed at various points throughout the country as the needs of the service demand.

**Charleston, W. Va.**—A peremptory writ of mandamus was recently awarded by the Supreme Court against the White Oak Fuel Co., at Scarbro, Fayette County, compelling it to furnish electricity for lighting purposes to all citizens in the town. This decision of the court places all coal companies whose plants furnish electric light to individuals under the definition of public-service corporations compelling the payment of a public-service corporation tax and other legal requirements for such concerns.

**Chicago, Ill.**—The Williams Patent Crusher & Pulverizer Co. has recently prepared Crusher Book No. 5, which covers every phase of coal crushing, a copy of which may be obtained upon application. This firm reports that many of the orders which it has received during the past few months are repeat orders, and that most of the machines sold are in use in connection with byproduct and beehive ovens preparing the coal to the general specifications of 90 per cent. through a ⅛-in. circular opening. The company reports that present prospects for business are bright, that inquiries are good, and sales exceptionally so.

**Edmonton, Alta.**—The United Collieries of Canada, Ltd., which controls large quantities of lignite within transmission distance of the city of Edmonton has made a proposition to the city to construct a modern power plant at the mine, transmit power to the city, and sell it to the municipality in bulk to be distributed by the civic distribution plant. As a basis of negotiation the company proposes an agreement to supply all power required at present at a rate not exceeding $12 per horsepower-year of maximum demand, plus a charge of six-tenths of a cent per kilowatt-hour subject to reduction provided enough industries will employ day or off-peak power. This offer is under consideration by the city.

# Coal Trade Reviews

## General Review

**Heavy movement of anthracite but spring opening lacks the customary snap. Bituminous completely flat in all sections. Curtailment in industrial activity, large stocks and indications of an early resumption of mining have brought business to a standstill. Outlook poor.**

Although the anthracite trade is experiencing a certain spring activity, it is becoming more apparent all the time that there is an absence of the customary snap and urgency. As usual, all companies will carry some of the April orders over into May, particularly for stove coal, and this paucity of supplies is being accentuated by a recurrence of the incipient "button" strikes, which has threatened to materially restrict production. The trade is most active in the line business; the situation at tidewater is showing a tendency to drag and lake shipping is slow in getting under way. The large output of domestic coal is also threatening to develop a surplus of the steam grades.

The demand for prompt bituminous has disappeared almost entirely. Prices are weakening, and coal of all kinds continues to pile up. The movement is confined entirely to contracts, requisitions on which are heavily curtailed as a result of the large stocks accumulated in anticipation of labor difficulties, and also in part to the general industrial curtailment. Much demurrage coal is being forced on the market, indicating considerable speculation on the labor agreement, and the situation will be further aggravated by the general resumption of operations in the central Pennsylvania district.

Contracting in the Pittsburgh district continues slowly on the same basis as last year with but little shading, although substantial concessions are offered on prompt and short-term business. A good water stage is permitting full operation at the river mines, while stocks generally are being liquidated, but the lake trade promises to be slow, and more men are returning to work than it will be possible to use. Shipments in Ohio are now reduced to a minimum, but consumers still have plentiful supplies as a result of the restricted operations in general industrial lines, and there is no anxiety felt over the possibility of a shortage. There is some slight demand for steam grades. The lake trade is open, but entirely devoid of any activity.

Business at Hampton Road is confined principally to shipments on contract, and there is rather an accumulation in local yards, although this will probably be moved shortly. The battleships of the American Navy, as well as those of other countries, manouvering in Mexican waters have thrown an unexpected demand upon the Southern ports at New Orleans, Pensacola, and Mobile, depleting stocks and causing a rush of urgent orders.

The Middle Western consumers are still using up stocks accumulated in anticipation of labor trouble, and there is no evidence of any improvement. What few mines have attempted to work, have been forced to close down in most instances as a result of the light demand. Some operators are accepting contracts at last year's figures, which would seem to indicate that an advance in the wage scale is not anticipated.

## EASTERN MARKET

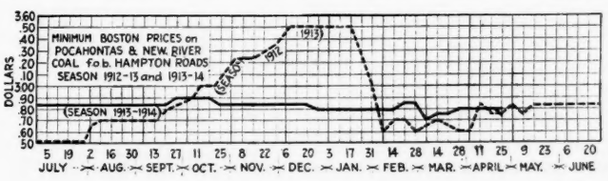
### BOSTON

**Emergency requisitions from Government have small effect. Heavy volume of Pocahontas and New River still at piers, and no relief to general dullness. Georges Creek and Pennsylvania situation unchanged. Stove coal getting into short supply.**

**Bituminous**—The war flurry has had small effect on the market as a whole. A few spot cargoes here have been disposed of to put battleships in readiness for sailing but the demand from that quarter will soon be satisfied. The call for fuel at Hampton Roads is only slightly in excess of normal, the piers there furnishing the bulk of the fleet coal during normal times.

Meanwhile Pocahontas and New River fuels continue to pile up and the agencies have not relaxed any in their efforts to move it. The prospect is now for a long dull summer with a heavy market, the $2.85 price probably being reasonably well maintained for the reason that operators for the most part will not permit sales that net anything lower. Buyers have seen no reason to change their attitude and it is hard to see where any broad market can come from. That there should be so much hopeful talk over the Government's emergency requirements and on such small excuse is only another indication of how dull the coastwise market is.

Contracts are still being closed, but almost entirely on alongside or on car figures so that the base price is not disclosed. Judging from what is known of the minimum water rates, however, there is small reason for doubting that many of the contracts lately closed will net less than $2.85 f.o.b. Hampton Roads. The lowest bidder on a municipal order for about 10,000 tons was $3.47 alongside Boston for Pocahontas or New River for the season which allowing insurance of 2c. and $2.85 for the coal, would leave but 60c. for a season water freight for a relatively shoal place when current rates for the largest transportation are 65@70c. for spot loading.


MINIMUM BOSTON PRICES on POCAHONTAS & NEW RIVER COAL f.o.b. HAMPTON ROADS SEASON 1912-13 and 1913-14
DOLLARS
(SEASON 1913-1914)
(SEASON 1912-1913)
JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APRIL MAY. JUNE

The Pennsylvania coals show a better situation all-rail than at tidewater, although no stone is left unturned to place coal. The majority of the operations are still under suspension with no near prospect of work being resumed.

**Anthracite**—May is expected to be a lighter month than April for shipments of hard coal into this territory but the volume received will depend somewhat on the proportion of stove size available. The companies find it difficult to meet the demand for this size and we are almost certain to run into a scarcity of it next fall. Retail trade is sloping off with the approach of warm weather.

Bituminous prices at wholesale are about as follows:

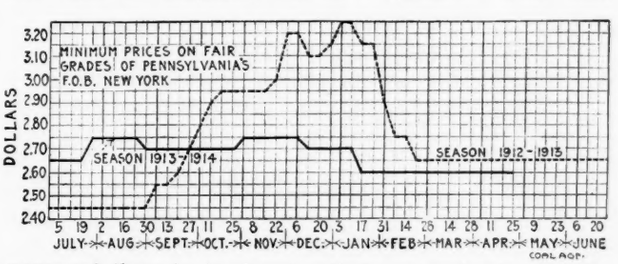
| | Clearfields | Cambrias Somersets | Georges Creek | Pocahontas New River |
|---|---|---|---|---|
| Mines*..... | $0.95@1.50 | $1.20@1.65 | $1.67@1.77 | |
| Philadelphia*..... | 2.50@3.05 | 2.75@3.20 | 3.22@3.32 | |
| New York*..... | 2.20@2.75 | 2.45@2.90 | 2.92@3.02 | |
| Baltimore*..... | ..... | ..... | 2.85@2.95 | |
| Hampton Roads*. | ..... | ..... | ..... | $2.80@2.85 |
| Boston†..... | ..... | ..... | ..... | 3.60@3.78 |
| Providence†..... | ..... | ..... | ..... | 3.55@3.73 |

* F.o.b. †On cars.

### NEW YORK

**Prompt bituminous market at a complete standstill and considerable coal reported on demurrage. Movement entirely on contracts. Line business on domestic grades of anthracite about normal but slow at tidewater.**

**Bituminous**—The New York soft-coal market has seldom ever been so completely flat as at present. What little


MINIMUM PRICES ON FAIR GRADES OF PENNSYLVANIA'S F.O.B. NEW YORK
DOLLARS
SEASON 1913-1914
SEASON 1912-1913
JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY JUNE
COAL AGE

movement there is, is almost entirely on contracts, and the demand on these is heavily curtailed by reason of the stock accumulated in anticipation of a suspension in mining, and also as a result of the general curtailment in industrial activity. The prompt market is as completely dead as it is

possible to imagine. There is some demand in the line trade, but none whatever at tidewater, and the fact that large tonnages are being forced on the market to avoid demurrage indicates that there was considerable speculation on an adverse turn to the labor situation.

Western Maryland coal has been offered at down to $1.90@$2, f.o.b. It is probable that the situation will be further aggravated by the general resumption of mining in the Central Pennsylvania district, an agreement between the miners and operators having been reached, but subject to a referendum vote May 4. Operators hesitate to predict how much the mines will work, but it is doubtful if more than two or three days a week will be possible.

Unless there is a decided change in conditions, the outlook for the summer is highly unfavorable. The one encouraging feature in the situation is the determined efforts the agencies are making to obtain last year's prices, or better, on contracts, and also the excellent manner in which nominal quotations are being maintained on the better grades in the prompt market. Although substantial concessions are obtainable on odd tonnages of coal, particularly when on demurrage, the nominal circular continues as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

**Anthracite**—The large hard coalers report that they cannot supply current orders, and that much April business was carried over into May. In addition to this the situation is being further strained by a recurrence of "button strikes" which are delaying operations.

In the prepared grades, stove coal is generally the shortest in all departments, and chestnut the easiest, moderate concessions being offered by the individuals for prompt movement. The situation on egg coal is rather mixed, the free burning grades being notably short, while individuals are forced to make cuts in the regular circular in order to move prompt shipments of the off-qualities.

In the steam department the high grades of pea coal are moving off promptly, while the lower qualities are selling off as much as 20c. per ton. The lower grades of No. 1 buckwheat are offered down to $2.35, with premiums of 10c. prevailing on the better qualities. About the same condition applies on Nos. 2 and 3 buckwheat.

It is obvious that heavy operations at the mines, occasioned by the large demand for domestic coal, is developing a surplus of the steam grades. Line business on all the domestic coals is about normal for this period of the year, but there is a heavy falling off in the tidewater trade, particularly locally. We quote the New York anthracite market in which the new May circular has gone into effect, as follows:

| | Upper Ports | | Lower Ports | |
|---|---|---|---|---|
| | Circular | Individual | Circular | Individual |
| Broken | $4.70 | | $4.65 | |
| Egg | 4.95 | $4.85@4.95 | 4.90 | $4.80@4.90 |
| Stove | 4.95 | 4.95 | 4.90 | 4.90 |
| Chestnut | 5.20 | 5.20 | 5.15 | 5.05@5.15 |
| Pea | 3.55 | 3.55 | 3.45@3.50 | 3.25@3.50 |
| Buckwheat | 2.80 | 2.80@2.90 | 2.50@2.75 | 2.35@2.75 |
| Rice | 2.30 | 2.30@2.40 | 2.00@2.25 | 1.80@2.25 |
| Barley | 1.80 | 1.80@1.90 | 1.70@1.75 | 1.40@1.75 |

### PHILADELPHIA

**Anthracite trade still satisfactory. Domestic sizes in good demand, but steam grades flat. Bituminous market dull, with little improvement in sight, either in the way of prices or demand.**

**Anthracite**—The second month of reduced prices finds the anthracite trade in a satisfactory condition. At this season of the year, however, the market for the small or steam sizes begins to contract, and as a result, individual operators are commencing to cut prices, and the large companies to stock their surplus. The past winter, it is understood, has been a distinct disappointment in the demand for pea, it was only at the end that there was any marked call for this size, and it is understood that quite a tonnage was carried over, when as a rule, the storage places are found bare.

Domestic sizes still continue in good demand. A large number of orders were carried over, and the prospect looks good for at least the month of May. Those conversant with the market, however, are loth to predict what the situation is likely to be after May. While there is a large tonnage moving, at the same time, the trade seems to lack the snap that should characterize it at this period. Egg and stove are the leaders, with the companies drawing on their storage supplies for the former. There are no stocks of the latter, and it is impossible to fill the requisitions made. Chestnut is not moving off as well as desired, although there is no indications of price cutting on this size. Prices at tidewater rule about as follows:

| | Circular | Individual |
|---|---|---|
| Broken | $4.35 | $4.35 @ 4.45 |
| Egg | 4.60 | 4.60 |
| Stove | 4.60 | 4.60 @ 4.70 |
| Chestnut | 4.85 | 4.85 |
| Pea | 3.25 | |

**Bituminous**—Marked dullness still characterizes the bituminous industry. This is due to the fact that the manufacturers, carry sufficient stocks, and also many industrial establishments are working either on short time, or not at all. The opening up of the Lake trade, is expected to improve conditions somewhat, but the operators are not depending on this to strengthen the market. Good coals can be bought at from $1.35 to $1.50 at the mines, grading down to $1 to 95c. for the cheaper varieties.

### BALTIMORE

**Remarkably dull situation in the coal business generally. Prices weakening under the light demand. Pennsylvania and Ohio suspensions have not aided the market in any way.**

The soft-coal business has been remarkably dull and the past week proved the dullest yet. While there is, of course, a certain call for contract fuel, this is not at all what it should be, and the spot market has disappeared almost entirely. Prices are weakening under the light demand, and the past week witnessed sales of West Virginia gas and steam coals at figures off what had been obtained recently, and while the Pennsylvania situation held somewhat better, it was still wobbly to say the least. With gas coals there was recorded sales of slack on contract as low as 60c.; run-of-mine at times sold down to 70c. and three-quarter at 80c. Maryland and West Virginia steam coals of less desirable variety were quoted around 80c. or a little better. Low grade Pennsylvania fuels were hugging the dollar mark, and best grades holding steady at around $1.30.

The trade had rather expected that the suspension in Pennsylvania and Ohio might have the effect of tightening the market, but such has not been the case. There is more than enough fuel to meet the demand. In regard to the strictly local stiutaion, it about measures up to the general conditions. Cancellation of some shipments to Tampico the early part of the market threw some little coal free at tide, but arrangements were made to take it up.

The anthracite situation remains unchanged. It will be well into the present month before there is any special activity to take advantage of the low schedule of the year, which will last until May 31.

## CENTRAL STATES

### PITTSBURGH, PENN.

**Annual contracts being closed at moderate rate with some concessions and considerable shading on prompt. Pittsburgh district operating at 35 per cent. of capacity. Ample labor supply and very light demand for coal. River mines operating almost full.. Connellsville coke stagnant, with a further decline in production and shipments.**

**Bituminous**—Coal contracts which expired Apr. 1 are being renewed at only a moderate rate. The leading interests are holding to the same prices as prevailed a year ago, with a basis of $1.30 for mine-run, but they are all quoting 1¼-in. at $1.50 whereas last year the regular price on domestic was $1.55 while some operators made a differential of five cents on the same coal for steam purposes, quoting it at $1.50. There is occasional shading on contracts, but not a great deal. Spot coal, on the other hand, is offered at various low prices and some short-term contracts are being made at 10@15c. under the regular market. Regular prices are as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.50, per ton at mine, Pittsburgh district.

The referendum vote on the adoption of the Cleveland scale unchanged for another two years has been completed, and the official announcement will be made May 1. Immediately thereafter a conference will be arranged to settle various local points with respect to the Pittsburgh district. No trouble is expected on these matters, though there may be considerable discussion.

Lately more men have been willing to work than there is employment for. Mines in the Pittsburgh district are operating this week at an average of not over about 35% of capacity and are finding difficulty in maintaining even this rate. The trade is suffering from three things, the stocks recently accumulated, an industrial depression and failure of the lake trade to open. The stocks are being liquidated and will cut little figure within another fortnight. The lake trade promises to be slow until July, and shipments from mines will be

particularly late in starting in volume because there is much coal loaded in vessels last fall and which will have to move up the lakes first.

The river mines are working practically full, loading coal for shipment down the river as fast as the boats can take it. Nearly all the mines of the leading interest are now able to ship by rail, and it is the desire to take care of the river demand now and then divert the capacity to rail shipment for the lake trade. There has been a good river shipping stage for some time.

**Connellsville Coke**—The market is stagnant, with prices showing a slight softening tendency. The leading operators are still holding to $2 for contract furnace coke but there is no demand. Prompt coke is a shade easier. We quote: Prompt furnace, $1.85@1.95; contract furnace, $2; prompt foundry, $2.35@2.45; contract foundry, $2.35@2.45, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Apr. 18 at 334,655 tons, a decrease of 20,070 tons, and shipments at 325,545 tons, a decrease of 22,866 tons. Production exceeded shipments by 9110 tons.

## BUFFALO

**Bituminous waiting for stocks to be reduced. Too much nonunion coal coming in. Coke still not moving. Anthracite only fairly active. Market nowhere improving as yet.**

**Bituminous**—There is still too much newly-mined coal in the market for any improvement. The Allegheny Valley, Pittsburgh and Central Pennsylvania field operators are holding together firmly, not operating unless they have customers that have no stocks ahead, but there is a lot of coal coming in from the Panhandle district beyond Pittsburgh, which takes a Pittsburgh rate and this is making trouble. It is mined by nonunion labor, but even then is selling at sacrifice prices as a rule. Jobbers report that they are buying this coal at prices below cost, while at the same time quite a large amount of it pays demurrage before it is finally disposed of. If the whole mining interest could be made to stand together and do little work till the surplus is gone there would then be a chance of re-establishing a paying market.

There is still no general quotation except the former: $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.25 for slack, no part of the trade having any life in it but slack, though most of the operators refuse to sell at a reduction. Pittsburgh has fixed the same Buffalo price as last year and will maintain it as far as possible. The continued strength of slack is on account of the poor lake trade.

**Coke**—The demand for coke has not improved and is not likely to till there is better movement of iron, which is not looked for right away. It would seem, rather, that the market grows more quiet from week to week. Connellsville prices remain fairly firm at $4.50 for best 72-hr. foundry.

**Anthracite**—The end of April finds the demand far less active than in recent years. There is a steady call and the rail movement is good, but the sales offices are not getting urgent orders from country consumers and jobbers. There is some scarcity of egg coal in this market, the leading companies not appearing to have taken care of that market very carefully as some ran entirely out of this size. Actual consumption is small now, but there is always some demand.

The lake trade is as dull as other branches. Instead of the winter-loaded cargoes rushing out, so that the vessels can bring down other waiting freight they now appear indifferent to getting away. So far the clearances have amounted to only 115,000 tons, most of it for Lake Superior ports. It is stated that some ports are still very badly blocked with last seasons coal.

## TORONTO

**Anthracite moving on the Lakes. Demand becoming less.**

Trade is steady with diminishing demand as the season advances. The yards are well stocked and supplies of anthracite coming forward freely by water since the opening of navigation. The usual reduction in prices of anthracite will be made about May 1. The figure has not yet been fixed, but it is not likely that the price will be put below $7.50 per ton. There is no change in present quotations.

## TOLEDO

**Supplies still large and business at a standstill. Mines closed for an indeterminate period. Some movement in the Lake trade.**

So far as the retail market in Toledo is concerned business is exceedingly dull and prices are demoralized. There is a light demand for both domestic and steam coal. The factories are well supplied in anticipation of the strike. The warm weather has, of course, made the domestic demand light. Ohio mines are all closed down and there is little prospect of an immediate return to activity but supplies seem to be sufficient to meet all demands.

The opening of navigation has witnessed some improvement and several boats have cleared from this port while others are now loading. There is an immense amount of coal on track in Toledo and the T. & O. C., yards are full of loaded cars. There has been no change in quotations. Coal men here are optimistic as to the future and it is generally believed that so far as lake business at least is concerned Toledo will have a profitable year.

## COLUMBUS

**Prices show no strength despite the month's suspension. Some West Virginia coal coming in, but stocks are still sufficient to last for 45 to 60 days. Conference of operators and miners adjourned without agreement.**

The feature of the Ohio coal trade is the irregular prices which have prevailed despite the fact that all the local mines have been out of commission snce Apr. 1. Apparently there is not much demand and inquiries are not numerous. On the whole the trade is quiet and the prospects for the future are not bright.

Some West Virginia coal is finding its way to Ohio, but prices on the whole have been weak. Mine-run is sold as low as 70c., while ¾-in. is bringing less than $1 with domestic lump almost as cheap. These prices only prevail, however, where West Virginia coal has been shipped in on consignment. Retailers have sufficient stocks to carry them through until the usual stocking-up period. Outside of the demand for fancy grades such as Pocahontas and splints there is not much call for domestic sizes.

Since the conference of operators and miners adjourned without agreeing on a mining scale, the entire situation is unsettled. There is talk of the miners' officials calling a strike and that might complicate matters still further. Miners generally show an anxiety to return to work.

While navigation on the Great Lakes has been formally opened, there is not much stir in the lake trade. It is doubtful if there will be any appreciable tonnage of Ohio coal shipped before June or July, as reports from the Northwest show that there is still a large tonnage on the docks of that section.

What quotations are being made in the Ohio fields are as follows:

| | Hocking | Pittsburgh | Pomeroy | Kanawha |
|---|---|---|---|---|
| Domestic lump | $1.45@$1.35 | | $1.50@$1.40 | $1.40@$1.35 |
| ¾-inch | 1.30@ 1.25 | $1.20@$1.15 | 1.35@ 1.30 | 1.30@ 1.25 |
| Nut | 1.25@ 1.20 | | 1.30@ 1.25 | 1.25@ 1.20 |
| Mine-run | 1.15@ 1.10 | 1.10@ 1.05 | 1.15@ 1.10 | 1.15@ 1.10 |
| Nut, pea and slack | 0.90@ 0.85 | | 0.90@ 0.85 | 0.80@ 0.75 |
| Coarse slack | 0.80@ 0.75 | 1.00@ 0.95 | 0.80@ 0.75 | 0.70@ 0.65 |

## CLEVELAND

**Little coal coming in and the market is only just able to absorb it. Prices continue low. Lake business opening slowly; few requisitions received from upper lake docks. The first coal has been delivered at Lake Superior ports.**

All week coal receipts in Cleveland have not exceeded fifty cars in any one day. The average amount of coal on track was hardly more than fifty cars and it was moved at the low prices that have prevailed for a month. Nonunion mines in western Pennsylvania, No. 8 mines in Richland, West Virginia and Fairmount gas operations continue to supply the market.

There has been some inquiry for coal for shipment and an Ohio No. 8 operator quoted seven cars of slack in reserve at the mines at 90c. This sort of inquiry is not extensive and hardly indicates that storage stocks are being exhausted. It comes more from companies that did not store much coal against a suspension. The limited market has tended to make the operators less eager to meet the demands of the miners for increased wages. This and the fact that the suit to test the legality of the screen-coal law will be decided early in the week, were big factors in bringing the joint conference at Columbus to an end.

**Lake Trade**—Saturday, vessels with coal arrived at Duluth-Superior and at Fort William-Port Arthur, the two largest coal receiving ports on Lake Superior. All of the lake ports were entered by vessels during the week. The coal shippers, however, are very busy getting boats to load before May 1 when car service goes into effect on lake coal on all railroads except the B. & O. and C. H. & D. which began charging car service Apr. 15. There is not a great deal of coal on track or en route, but shipments are so uncertain it would be dangerous to depend upon credits to balance car service charges on coal already on track. After next week shippers will find it comparatively easy to get vessel capacity as the boats will be largely in commission and will need coal.

Anthracite and Pocahontas are selling well. May circular is being asked for both coals shipped now. The advance amounts to about ten cents a ton. Spot coal is selling at $1.70@1.80 for slack of all kinds and lump at $2@2.05. For shipment the following prices are being asked:

| | Pocahontas | Youghiogheny | Fairmont |
|---|---|---|---|
| Lump | $3.05 | .... | $2.05 |
| Lump, 1¼-in. | .... | $2.55 | .... |
| Lump, ¾-in. | .... | 2.40 | .... |
| Egg | 3.05 | .... | .... |
| Mine-run | 2.60 | 2.20 | .... |
| Slack | 2.60 | 1.50 | 1.80 |

### CINCINNATI

**Demand continues slack in all lines, largely on account of the delayed lake movement. Pocahontas the only strong grade on the list. Practically no market on other varieties.**

Despite the growing seriousness of the labor situation the local market has shown no signs of strengthening. The usual heavy spring contract demand for Pocahontas is the only cheering feature of the situation; in other respects the market is abnormally quiet.

The steam grades, including nut and slack from the Eastern Kentucky field and some of the same grade from the several West Virginia districts, are in fair demand, as practically all industrial consumers in and around Cincinnati are operating on nearly full time. Buying seems to be very light, however, and only for current consumption. A plentiful car supply in all fields now operating, and the light demand in the Lake trade have contributed to the present slowness.

There is little consignment coal on track in Cincinnati, however, this being a peculiar feature of this market, growing out of the fact that there is no reconsignment privilege, and demurrage charges accumulate too rapidly, without an opportunity to market the coal at outside points. The railroads also refuse to accept coal for shipment on consignment, and this has served to keep Cincinnati free from surplus fuel such as frequently chokes other markets.

Owing to conditions indicated, prices are about what the purchaser cares to make them, although there has been no great concession made in this respect. Most of the selling agencies are holding out for 85c. on contracts for steam coal, for example, but at the moment that price will buy block, as one operator put it.

### DETROIT

**Consignment coal cleaned up and a more optimistic feeling prevails. Stocks still large, but opening of Lake navigation will stimulate business.**

**Bituminous**—The local agencies have finally succeeded in cleaning up all of the track coal in this vicinity, and are now advising operators that they will accept no further fuel on consignment except at their own risk. Even yet there is a great deal of cheap coal offered, there being plenty of lump available recently at 70c. with no buyers. Manufacturing plants and railroads are reported as well stocked for several weeks to come yet. However, there are some members of the trade who freely predict better conditions shortly, particularly when the lake movement gets under way in full blast. Conditions seem to be improving in general business.

**Coke**—There has been a slight break in the coke market, as is only to be expected at this time of the year. The Semet-Solvay product has consistently held its own, but gashouse is off 50c. on quotations to the retailer, and 25c. to the consumer.

### HAMPTON ROADS

**Only fair movement for the week. Principal shipments to New England. Rather excessive accumulation in local railroad yards.**

Dumpings at Hampton Roads have been fair. There has been no heavy demand and the greater part of the coal moving has been on contract business or on sales made during the previous week. The coastwise shipments have been principally to the New England ports although some small cargoes have gone South. In addition to Pocahontas and New River run-of-mine there has been several small cargoes of high volatile shipped to the New England market.

Foreign shipments have been made to Rio de Janeiro, Canal Zone, Dakar, Kingston, Leghorn and La Plata. Owing to the light demand for coal, vessel chartering has fallen off and for several days there was considerable tonnage here seeking charters.

The accumulation of cars on the railway terminals is somewhat above normal but vessels about due will considerably reduce this and indications are that some of the suppliers will be loading government colliers which will in all probability cut the accumulation to below the average.

### LOUISVILLE

**Market continues dull and heavy although there are indications of improvement. Concessions necessary to move coal on consignment.**

Local operators and dealers report a slight improvement in the local trade marked by a somewhat increased demand in both the Eastern and Western Kentucky fields. Such stocking as there has been so far this spring is lighter than customary, a condition attributed to a disappointing winter. Operations in Western Kentucky continue practically at a standstill, with only the nonunion mines working, though in the eastern part of the state operations are said to be better than usual.

In spite of a slow domestic market, steam coals are in such poor demand that the dealers having nut and slack on consignment have found it necessary to cut prices sharply in order to dispose of it. One representative of a Western Kentucky operating company in Louisville complained that Eastern Kentucky slack had been offered there at below cost of production.

A feature of the Eastern Kentucky market is that several of the Jellico operators claim to be getting as high as $1.75 to $1.85 f.o.b. mine for block coal, but this is for fancy and highly advertised grades. Elsewhere in the eastern section prices range from $1.30 up for the block coals and on down to from 50 to 60c. for the pea and slack of Western Kentucky.

### BIRMINGHAM

**Market on both steam and domestic coal far below the average. Furnace and foundry coke quiet. Blacksmith falling off slightly in tonnage. Little doing in the pig-iron market.**

The market on domestic lump is quiet. Operators having regular agents at various points are having less trouble to move their product than others. Regular agents are required to take a certain monthly tonnage during the summer, and they are keeping the coal moving fairly well.

The steam market is also quiet, though the bunker business at New Orleans, Mobile and Pensacola is taking quite a good tonnage. The operators state that the usual falling off in blacksmith coal has started, the tonnage during the fall and winter being more than in the summer; however, the prices are being maintained. Both furnace and foundry coke are weak, with few buyers, and quotations are off about 25c. Furnaces report only a small amount of pig iron sold during the past 10 days.

### NEW ORLEANS

**Coal requirements for American fleet deplete local stocks and increased orders are being sent out. Usual trade continues inactive.**

Unexpected activity pervades the coal industry here due to the demand for coal for use by the American fleet in Mexican waters. Fuel is even being shipped by rail from here to Galveston to coal the army transports. One hundred and twenty-five cars have been forwarded this week and dealers instructed that further supplies probably would be needed. In addition to the American war vessels, which will secure a portion of their coal here, ships of other nations, on duty in gulf waters, are putting in for supplies. The "Conde" of the French navy filled every bunker here this week and two of the British vessels will coal here as soon as they can be spared from duty on the Mexican coast.

This has changed the whole outlook here. Stocks that were too heavy for this time of year have dwindled almost overnight. Orders to the mines in Pennsylvania, Kentucky, Indiana and Alabama have been increased. With high water in the rivers, deliveries can be made quickly from the upriver section. There are also plenty of cars available for the movement of coal from Birmingham and efforts are being made to increase the receipts from the Warrior River section of Alabama via the water route.

Other than the movement of coal for the use of the fleet demand is light. Few contracts are being made and retail dealers in this territory are placing no orders in the belief that lower prices will be obtainable. Despite the lowering cost of fuel oil many plants are showing reluctance to reconvert their boilers, fearing another increase in price which will make it necessary to use coal again.

### INDIANAPOLIS

**Few mines in operation and trade slow as a result of the large purchases in February and March. Contracts and sales in open market being made at old prices. Coal situation influenced more by industrial than mining conditions. Retail prices unchanged from winter schedule. Little or no domestic buying.**

Owing to the fact that most large consumers of Indiana coal laid in a 30- to 60-day supply during the efforts of operators and miners to reach a new wage agreement, trade is now slow. Few of the mines are running. It has been difficult to make new contracts because coal buyers are waiting for industrial conditions to improve. It is the general im-

pression that there will be no strike, largely because the miners need money, both individually and for their organization, which has been severely taxed, supporting many strikes. It is said operators have been making new contracts based on the old scale, which is an indication of their opinion of the outcome of the present negotiations.

Indianapolis dealers are still selling at winter prices. They say they have not yet been able to make contracts with the mines for next season. It is known, too, that they would like to dispose of present stocks at old prices before making any reduction.

Present prices at Indiana mines run about as follows: No. 4 mine-run, $1.10@1.20; Nos. 5 and 6, five to ten cents lower than No. 4; steam lump and nut, $1.25@1.40; egg, 15c. additional; No. 4 4-in. domestic lump, $1.80@2; No. 5, about 30c. lower; screenings, 80c. to 90c.; Brazil block, $2.25@2.50.

### ST. LOUIS

**Market unchanged with little business being done. A few mines working, and even some of these are closing down because of poor business. Consumers showing no anxiety at all over the situation.**

There is practically no change in the local market; little trading is being done, and there is no great tonnage of coal being offered. The steam market is somewhat irregular, Standard screenings bringing as low as 75c. or 80c. one day, and going to 90c. or higher the next day. Standard 2-in. lump is sold as low as 85c. and as high as $1.05. The nut coal is worth 90c. and egg the same. There is no Big Muddy coal offered and little from the Mount Olive field.

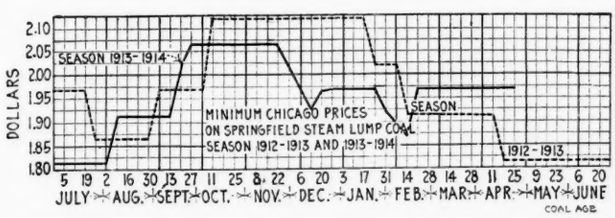
Carterville lump and egg is offered as low as $1.15, the better grades bringing $1.25@1.35; screenings the past week have been as low as 85c., and as high as $1. Nut coal is in good demand at from $1.25 to $1.50, while mine-run can be bought from $1.05 to $1.15.

The coöperative mines in the Standard field are working, and here and there a commercial mine, with a few railroad operations. During the past week, two or three mines found it more economical to suspend operations than to work. There is no dealer demand, and little anxiety during the past week on the part of the manufacturing plants. Anthracite is moving in good volume, coke and smokeless dragging.

### CHICAGO

**Dull and heavy despite the general suspension. Consumers are using up stocks and still have considerable on hand. Some coal on demurrage.**

There has been no relief from the dullness in the Chicago market since the mines suspended and the demand is no better. The only active department is screenings on which prices are slightly higher. But there would not be a strong demand for a large production.


SEASON 1913-1914
MINIMUM CHICAGO PRICES ON SPRINGFIELD STEAM LUMP COAL SEASON 1912-1913 AND 1913-1914
SEASON
1912-1913
DOLLARS
2.10
2.05
2.00
1.95
1.90
1.85
1.80
5 19 2 16 30 13 27 11 25 8 22 6 20 3 17 31 14 28 14 28 11 25 9 23 6 20
JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY JUNE
COAL AGE

Dull conditions prevail in the anthracite market, although the buying has been a little stronger because retailers wish to get the April prices. The smokeless spot market has been comparatively good, although there is not a strong demand for prompt coal. A good deal of the spot coal is being shipped on new contracts and all that comes can be taken care of. Demurrage coal has been sold at an average of $1.10, although the larger companies are holding to circular prices. Splint coal has been only fairly active and there has been little demand for Illinois and Indiana fuels with the top figure of $1.25 for domestic lump as compared with the circular price of $1.35. Considerable activity is evident in the coke market, this being the contracting period for by-product coke. Some of the consumers are buying for storage and thereby aiding the present market.

Prevailing prices at Chicago are:

| | Springfield | Franklin Co. | Clinton | W.Va. |
|---|---|---|---|---|
| Domestic lump | $2.07 | $2.30@2.40 | $2.12 | |
| Steam lump | 1.97 | | 1.97 | |
| Egg | | 2.30@2.40 | | $3.65 |
| Mine-run | 1.87 | 2.15@2.25 | 1.87 | 3.05@3.30 |
| Screenings | 1.90@2.05 | 1.95@2.05 | 1.67@1.87 | |

**Coke**—Connellsville and Wise County, $5@5.25; byproduct egg, stove and nut, $4.45; gas house, $4.25.

### KANSAS CITY

**Improved business outlook has created a better feeling in the coal trade. Operations on about a half-time basis.**

Though little change was in evidence during the past week, the volume of future bookings was materially increased, due largely to more favorable crop conditions. With wheat in splendid shape in the Southwest, there seems to be little cause for concern on the score of crops and general business has thrown off its conservatism somewhat. The coal trade is among these and a much more optimistic feeling prevails than for some time. Demand is quiet for immediate needs, and about half-time operations is the rule in most parts of the Southwest. A feeling of unrest is noticeable among the miners and no increase of working hours or output is likely in the immediate future.

## PRODUCTION AND TRANSPORTATION STATISTICS

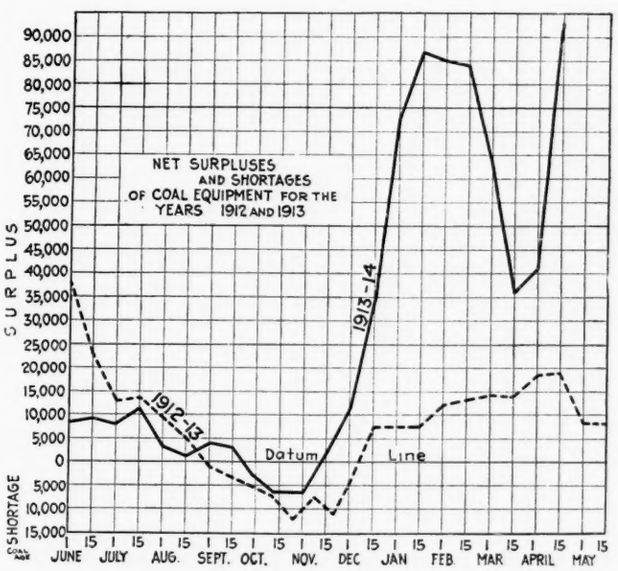
### THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended Apr. 15, as follows:

| | Surplus | Shortage | Net* |
|---|---|---|---|
| New England Lines | 738 | 0 | **738** |
| N. Y.; New Jersey, Del.; Maryland; Eastern Penn. | 12,965 | 0 | **12,965** |
| Ohio; Indiana; Michigan; Western Pennsylvania | 37,170 | 0 | **37,170** |
| West Virginia, Virginia, North & South Carolina | 7,354 | 0 | **7,354** |
| Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida | 14,147 | 0 | **14,147** |
| Iowa, Illinois, Wis., Minn.; North & South Dakota | 10,043 | 19 | **10,024** |
| Montana, Wyoming, Nebraska | 1,524 | 0 | **1,524** |
| Kansas, Colorado, Missouri, Arkansas, Oklahoma | 2,972 | 0 | **2,972** |
| Texas, Louisiana, New Mexico | 549 | 5 | **545** |
| Oregon, Idaho, California, Arizona | 4,677 | 0 | **4,677** |
| Canadian Lines | 0 | 0 | 0 |
| Total | 92,139 | 24 | **92,115** |

| | Dec. 15 | Jan. 1 | Jan. 15 | Feb. 1 | Feb. 15 | Mar. 1 | Mar. 15 | Apr. 1 |
|---|---|---|---|---|---|---|---|---|
| Surplus | 36,435 | 72,535 | 87,149 | 85,489 | 84,775 | 64,822 | 39,133 | 41,055 |
| Shortage | 2,295 | 57 | 789 | 102 | 239 | 1,394 | 3,282 | 615 |
| Net* | **34,140** | **72,478** | **86,360** | **85,387** | **84,536** | **63,428** | **35,851** | **40,440** |

*Bold face type indicates a surplus.




### SOUTHWESTERN TONNAGE

The following is a comparative statement of the Southwestern tonnage for October and the first ten months of the years 1912 and 1913:

| State | October 1912 | October 1913 | Nine Months 1912 | Nine Months 1913 |
|---|---|---|---|---|
| Missouri | 315,419 | 317,466 | 2,438,163 | 2,367,435 |
| Kansas | 524,315 | 609,827 | 4,152,505 | 4,676,157 |
| Arkansas | 205,031 | 209,693 | 1,579,505 | 1,616,480 |
| Oklahoma | 319,717 | 340,915 | 2,384,278 | 2,864,050 |
| Totals | 1,364,482 | 1,477,901 | 10,554,451 | 11,518,12 |

This statement only covers the tonnage of members of the association, which is estimated to be at least 95% of the entire tonnage produced in the four states.

# Financial Department

## Lehigh Coal & Navigation Co.

President S. D. Warriner, of this company, reports for the year ended Dec. 31, 1913, as follows:

**Income Account**—For purposes of comparison the income account of the previous year has been restated to conform to the revised plan of accounting. Gross revenue for the year was $15,294,687, an increase of $1,486,037, due to (a) increases in coal revenue of $1,028,573, in canal revenue of $2,507, and in miscellaneous revenue of $464,114; and (b) decrease in railroad revenue of $9157. The net revenue of the several departments was $3,735,828, an increase of $100,101, and the net income was $2,372,511, an increase of $84,255.

The net miscellaneous revenues for the year was $833,646, an increase of $411,383, as compared with the net revenue for the year 1912, based upon the same method of accounting. This increase is mainly accounted for by an initial dividend of 4% on stock of the Lehigh & New England R.R. Co. and by profit from the sale of surface lands in the mining region.

**Bonds and Notes**—In order to provide for general corporate purposes, the company issued on July 1, 1913, $1,500,000 one-year 5% secured gold notes, secured by deposit of $1,250,000 general mortgage 4½% bonds, due May 1, 1912, and $1,000,000 funding and improvement 4% bonds, due July 1, 1948. Of these notes, $220,000 were subsequently retired by issue of treasury 4½% bonds.

To provide for the bonds and one-year notes maturing in 1914 [aggregating $10,054,519 in hands of public] and for general purposes, present and future, the board has authorized a consolidated sinking fund mortgage dated Jan. 1, 1914, securing an authorized issue of $40,000,000 gold bonds, maturing Jan. 1, 1954, and containing provisions for the retirement of prior liens. The initial issue of these new bonds, "Series A," will be for a total of $18,000,000, bearing 4½% interest. Of this series $14,000,000 has been sold.

**Taxes**—Our taxes continued to show an increase, the total amount of taxes in 1913 being $540,720, as compared with $450,567 in 1912, due principally to the imposition of a tax of 2½% on the value of anthracite coal as prepared for market, in accordance with an act of the Pennsylvania legislature, effective June 28, 1913. In 1908, our taxes were $288,483; in 1913, $540,720, an increase in five years of about 87%.

During 1913 state taxes in dispute accruing for 1910, 1911 and 1912 were settled adversely to this company, and payments amounting to $213,021 were made and charged against profit and loss.

**Coal-Mining Department**—Coal tonnage from lands owned and controlled:

| | 1913 | 1912 |
|---|---|---|
| Mined by company | 3,612,711 | 3,241,388 |
| Mined by company lessees | 209,018 | 183,892 |
| Recovered from culm banks by company and its lessees | 724,524 | 455,902 |
| Less consumed as fuel by company and its lessees | 551,486 | 424,093 |
| Net commercial coal produced by company and its lessees | 3,994,767 | 3,457,089 |
| Net by Alliance Mining Co. and its lessees | 147,144 | 159,843 |

Two new shafts, one at Rahm Colliery and one at Coaldale Colliery, are being sunk to develop the low levels.

During the year the company expended for permanent additions and betterments $816,450, charged to capital, and in addition $398,977 was charged against operation on account of underground developments and improvements, new stripping operations, and extraordinary repairs and renewals. There has been charged for depreciation and other reserves $476,777, and to cover obsolescence, $242,976.

On May 1 the claim of employees for additional wages under the sliding-scale percentage, in effect since 1902, was decided in favor of the men. Under this award your company paid during 1913, $25,771.

The sales of coal during the year 1913 amounted to 3,529,094 tons, a decrease of 117,337 tons, as compared with 1912. Market conditions late in 1913 were unsatisfactory. The shipments of anthracite coal by the producing companies have exceeded market requirements, this condition being caused by the mild weather of two successive winters, which unsettled the trade and decreased consumption. The net revenue received from coal for the year was $464,746, a decrease of $200,430 from 1912, based on the same method of accounting.

**Note**—For previous annual report of this company see "Coal Age," Vol. 3, page 552.

GENERAL BALANCE SHEET, DEC. 31, 1913

| | |
|---|---|
| **Assets** ($62,513,921)— | |
| Coal lands, mining and marketing property, $17,456,799; canal property, $3,414,857; real estate, $1,018,753; total | $21,890,409 |
| Railroads and other property owned or controlled: Physical property, $16,847,132; securities pledged, $7,988,311; securities unpledged, $6,286,786; total | 31,122,229 |
| Securities of uncontrolled companies pledged, $432,750; company's securities pledged, $3,399,000; total | 3,831,750 |
| Cash | 984,444 |
| Company's stock in treasury, $29,700; bonds, $393,813; securities of uncontrolled companies, $638,066; total | 1,061,579 |
| Customers' acounts, $1,231,307; sundry debtors, $512,958; total | 1,744,265 |
| Coal stock, $1,188,296; materials and supplies, $383,976; total | 1,572,272 |
| Accrued interest and dividends receivable, $16,719; sundry accrued rentals receivable, $9094; total | 25,813 |
| Suspended debit accounts | 281,161 |
| **Liabilities** ($62,513,921)— | |
| Capital stock, $26,587,650; funded debt, $26,515,333; total | $53,102,983 |
| Loans and notes payable, $978,975; audited vouchers and payrolls, $909,550; total | 1,888,525 |
| Sundry creditors, $884,059; accrued taxes, $378,155; total | 1,262,214 |
| Matured interest on bonds, $177,301; accrued interest on bonds, $69,895; total | 237,196 |
| Matured and accrued rents, $2802; dividends unclaimed, $6991; total | 9,793 |
| Suspended credit acounts | 63,466 |
| Depreciation and other reserves, $4,055,359; profit and loss, surplus, *$1,884,384; total | 6,003,209 |

*After adding sundry accounts adjusted, $194,064, and deducting adjustment of state taxes for years 1910, 1911 and 1912, $213,021.

## COAL SECURITIES

The following table gives the range of various active coal securities during the week ending Apr. 25:

| Stocks | Week's Range—High | Low | Last | Year's Range—High | Low |
|---|---|---|---|---|---|
| American Coal Products | 83½ | 82 | 82 | 86½ | 82 |
| American Coal Products Pref | 102½ | 102½ | 102½ | 106 | 102½ |
| Colorado Fuel & Iron | 29 | 27½ | 28 | 34½ | 27½ |
| Colorado Fuel & Iron Pref | 140 | 140 | 140 | 140 | 140 |
| Consolidation Coal of Maryland | .... | .... | 102½ | .... | .... |
| Island Creek Coal Com | 49 | 48 | 49 | .... | .... |
| Island Creek Coal Pref | 86 | 85½ | 85½ | .... | .... |
| Lehigh Valley Coal Sales | 170 | 150 | 165 | .... | .... |
| Pittsburgh Coal | 20½ | 19 | 19 | 23½ | 17⅞ |
| Pittsburgh Coal Pref | 88¾ | 84 | 84½ | 93¾ | 84 |
| Pond Creek | 18 | 17 | 17½ | .... | .... |
| Reading | 162½ | 158⅞ | 159⅞ | 172½ | 158⅞ |
| Reading 1st Pref | 88¼ | 88¼ | 88¼ | 89 | 87⅞ |
| Reading 2nd Pref | 88¼ | 87½ | 87½ | 93 | 87½ |
| Virginia Iron, Coal & Coke | 45 | 45 | 45 | 52 | 40 |

| Bonds | Closing Bid | Asked | Week's Range or Last Sale | | Year's Range | |
|---|---|---|---|---|---|---|
| Colo. F. & I. g n. s.f.g. 5s | 97 | 98½ | 97½ | 97½ | 91½ | 99 |
| Colo. F. & I. gen. 6s | 104 | .. | 107½ | June '12 | .. | .. |
| Col. Ind. 1st & coll. 5s. gu | 74½ | Sale | 74½ | 75½ | 74½ | 82 |
| Cons. Ind. Coal Me. 1st 5s | .. | 74 | 73 | Mar. '14 | 73 | 79 |
| Cons. Coal 1st and ref. 5s | 89½ | 92 | 89 | Mar. '14 | 89 | 89 |
| Gr. Riv. Coal & C. 1st g 6s | 89 | .. | 99½ | Feb. '14 | 99½ | 99½ |
| K. & H. C. & C. 1st s f g 5s | .. | 98½ | 102½ | Apr. '06 | .. | .. |
| Pocah. Con. Coll. 1st s f 5s | 89½ | .. | 93 | Mar. '14 | 93 | 93½ |
| St. L. Rky. Mt. & Pac. 1st 5s | .. | 88½ | 88 | Apr. '14 | 84 | 88½ |
| Tenn. Coal gen. 5s | 77 | 81½ | 77 | 77 | 77 | 82 |
| Birm. Div. 1st consol. 6s | 101½ | .. | 101½ | 101½ | 97½ | 103½ |
| Tenn. Div. 1st g 6s | 102 | 103 | 102 | Apr. '14 | 101½ | 103 |
| Cah. C. M. Co. 1st g 6s | 101⅞ | 103 | 102 | Mar. '14 | 101 | 102½ |
| Utah Fuel 1st g 5s | 101 | .. | 101½ | Mar. '14 | 101½ | 101½ |
| Victor Fuel 1st s f 5s | .. | 75 | 80 | May '13 | .. | .. |
| Va. I. Coal & Coke 1st g 5s | 92 | 93 | 92½ | 92⅛ | 92⅛ | 95 |

### DIVIDENDS

**Lehigh Coal & Navigation Co.**—Regular quarterly dividend No. 142 of $1, payable May 29 to holders of record, Apr. 30.

**G. B. Newton Co.**—Dividend of 3½% on the first preferred, payable May 1 to holders of record Apr. 23.